THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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New Electric Furnace Manufacturing Plant

The New Plant of the Ajax Metal Company, Philadelphia, for Manufacturing the Ajax-Wyatt Induction Furnace for Melting Metals

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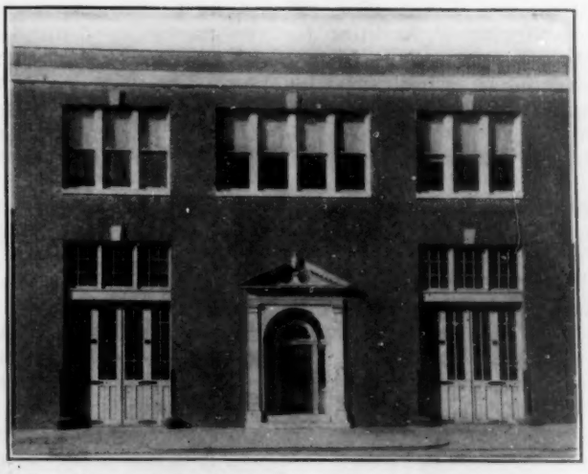
WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

THE Ajax Metal Company, Philadelphia, Pa., in its 50 years of existence and prominence in the non-ferrous metal industry, was the first of the large metal refining plants to apply scientific methods to the manufacture of non-ferrous alloys. The results of this company's early pioneering work have brought about new standards in many non-ferrous products.

Many types of melting furnaces were investigated during the time this research work on alloys was being fostered. G. H. Clamer, who is now the president of the company, and who for some time was actively engaged in carrying on the research program, realized the shortcomings of fuel-fired furnaces and looked for a solution in that new marvel of the twentieth century—electricity. Many attempts had previously been made to utilize the electric current for melting non-ferrous alloys, and although these efforts were always without success, Mr. Clamer and his associates in 1912 started an intensive development program to solve the problem. After several years of rather disheartening results, the combined efforts of G. H. Clamer and J. R. Wyatt resulted in the development of the furnace known throughout the world today as the Ajax-Wyatt induction furnace.

In the fall of 1916, the first Ajax-Wyatt Induction Furnace was placed in commercial operation. From this beginning, the widespread adoption of this electric furnace has been truly remarkable. Over 90 per cent of the wrought brass manufactured in America and approximately two-thirds of the world's production is now melted in this furnace. The outstanding and unique merits of the induction furnace, which so quickly made it "the standard melting tool" in the wrought brass industry, were so obvious that it was eagerly sought by foundries engaged in the manufacture of plumbing goods, valves, hardware, electrical supplies, etc. At first, the attempts to melt these foundry mixtures met with rather indifferent success, not because the furnace was not adapted to melting alloys other than brass in foundries, but solely because of the difficulty in obtaining refractory materials suited to the construction of the furnace.

The Ajax Metal Company set itself to the task of perfecting refractory materials for lining the Ajax-Wyatt furnace, so that it would be available for melting all ferrous and non-ferrous alloys. The long and tedious work



Entrance to New Electric Furnace Division, Ajax Metal Company, Philadelphia, Pa.

carried on by its engineers, working in conjunction with some of the largest refractory manufacturers, has at last been successful. During the past two years furnaces have been installed throughout the country, melting such high temperature alloys as red brass valve mixtures, architectural bronze, nickel silver, phosphor bronze, etc., and the foundries observe a decided improvement in the quality of castings. In most cases the improved quality has been directly attributed to the two prime metallurgical

At Left—A View of the Main Manufacturing Shop in the Ajax Metal Company Electric Furnace Division's New Plant on Frankford Avenue, Below Girard Avenue, Philadelphia

features of the furnace, namely, the automatic stirring of the metal bath throughout the melting cycle and the absence of any gases to contaminate the alloy.

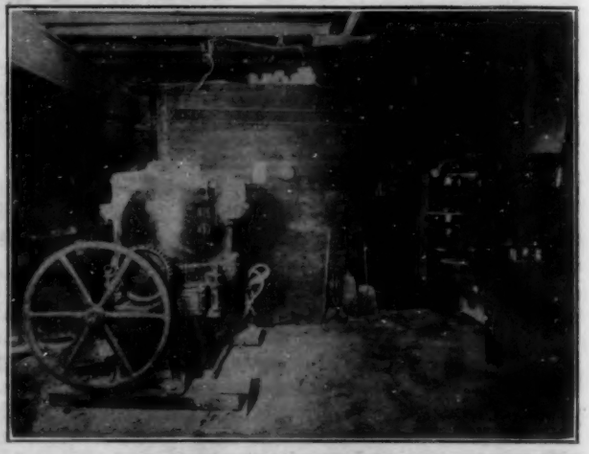
New Plant Constructed

Today there are over 750 of these induction furnaces in operation, melting more than 8,000,000 pounds of nonferrous alloys per day. In order to provide adequate facilities for servicing these furnaces, which are located not only in America, but in Europe, South America, Japan and China also, as well as to provide modern manufacturing facilities for the increasing demand of these furnaces, The Ajax Metal Company recently constructed an entirely new building. The plant is devoted exclusively to the electric furnace business of this company. Here the complete furnace units are manufactured and switchboards are assembled in a shop equipped with the most modern machine tool. A 5-ton traveling electric crane facilitates the handling of heavy castings and assembled units. The demand for larger units has been foreseen and provision made for their manufacture. At the present time furnaces, having a pouring capacity of 2200 pounds, are under construction.

Another section of the plant is equipped for carrying on experimental and research work in connection with the refractory and kindred requirements of the induction furnace. In this department, two melting units may be operated simultaneously. When a refractory is developed for any particular group of alloys, it is installed in a furnace and operated in this experimental department under conditions approximating commercial work. Frequently, such an experiment is kept in continuous progress for several months. The chemical laboratories at the main ingot plant of The Ajax Metal Company, which is located within half a city block, are available and their facilities are utilized when necessary in conjunction with electric furnace experiments.

Zinc Melting Furnace Developed

The advantages of maintaining such experimental facilities are manifold. Recently, The Ajax-Wyatt Electric Zinc Melting Furnace was placed on the market—a prod-

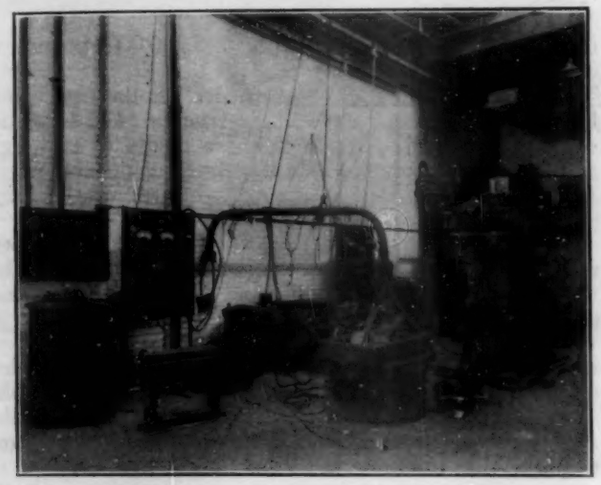


Below—A Typical Foundry Installation of an Ajax Electric Furnace

Testing Secondary Blocks Used in Ajax Furnaces, Prior to Shipment for Installation at Plants Where Metal Is Melted in This Type of Equipment

uct of Ajax engineers developed in the experimental department. This furnace is already in actual commercial operation. It should offer many advantages in the melting of such alloys as are used in the zinc die casting industry.

The lining for an induction furnace is composed essentially of a pre-fired and pre-formed refractory shape, granular refractory cements and insulating brick. Included in this new building is a separate three-story department with modern facilities for storing and handling these materials. The secondary refractory blocks are carefully inspected and given a thorough test for soundness. Those passing this rigid examination are carefully packed and stored to prevent damage prior to shipment. The granular refractory cements vary in composition depending on the alloy which is to be melted in the furnace. These various refractory cements which go to make up the completed blend, are first placed in large steel tanks on the third story of the refractory building. At the present time there are six of these steel tanks installed, each having a capacity of 30,000 pounds. These tanks have an outlet on the floor below, where the cements are properly proportioned and conveyed to the mixer. The blended refractory cement coming from the mixer is then placed in containers and stored to await shipment to the furnace user.



Section of the Experimental Department

The administrative, sales and engineering force have been provided with modern office facilities. The building is of colonial design and this style is used throughout the foyer and offices. The location is in one of the oldest manufacturing sections of Philadelphia. It is within a short distance of the spot on the Delaware River where William Penn landed and made his famous treaty with the Indians.

Section of the Refractory Department

Casting Chilled Bronze Gears

Q.—We are desirous of receiving information in regard to making chilled bronze gears. The mixture is to be 89% copper and 11% tin. The chill is only to go around the outside face of the gear.

We would like to know the correct pouring temperature on gears ranging in weight from 25 to 200 lbs. We would also like to know the proportion in weight of the chill to the casting.

We understand the chill is not to be finished on the side where the metal comes up against it but is to be left rough as it comes from the foundry. Is there any facing used on the chill; is the chill heated before being set into the mould, and, if so, to what temperature?

Can you give us any information as to how deep a casting can be chilled by using a cast iron ring chill? Any suggestions you have to offer as to gating would also be appreciated. The diameter of these gears would probably vary from 9 inches in diameter to about three feet.

A.—The idea of chilling bronze gears is to prevent segregation, and the chill is generally made in one piece. There is no objection to making it in three or more pieces if you so desire, and it is not necessary to finish the chill if you can cast the chill the correct size, so the pattern will draw when cast in one piece. The one-piece chill is used more as it prevents seams that will occur if cast in sections. The chill should be as wide as the face of the tooth and approximately 2 inches thick.

As regards heating the chill, it is necessary to heat it to remove all moisture. In reference to the proportioning of the chill to the size of the casting, all that is necessary is to make the chill thick enough so it will not warp, and proper thickness has been found for general run of gears, to be approximately 2 inches.

The iron is important and should run as high in graphite carbon as possible, over 3%. Bronze lies best on iron high in graphite carbon and low in combined carbon.

The chill is not a chill such as you get in iron, but causes the metal to set quickly and with less segregation. As far as hardness is concerned, there is very little difference between the casting made without the chill and one cast with the chill. In machining very little difference is noticed, if any at all. With a 2 inch thick chill, if the casting is broken the fine grain will show in approximately 1½ inches. The metal should be poured at approximately 2000 degrees F., and is best when two horn gates are used so the metal will enter quickly into the mold. Lard oil is used on the face of the mold to prevent sticking and burning; it is put on very light and rubbed well. Smoke from an acetylene torch is also used for this purpose.

—W. J. Reardon.

The Metal Producing Industries in 1929

A Symposium on the Past Year's Activities in the Non-Ferrous Field

Copper

By

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New York

REFINERY production of copper and shipments of the metal reached new high levels in the first ten months of 1929. The tonnage figures, in themselves, are evidence that copper is both maintaining and strengthening its position as a servant of industrial progress.

A more intimate picture of copper's contribution to progress in many fields is furnished by original research work of the Copper & Brass Research Association. A new survey of the railroad field just completed by the Association discloses, for example, that electrification work completed to date has employed more than 100,000,000 pounds of copper. Further electrification already under way or authorized and likely to be completed within the next four or five years will require an additional 100,000,000 pounds of copper.

As less than 1 per cent of the route mileage of American railroads has been electrified up to the present, it is obvious that the potential market for copper in this field is of tremendous proportions. Today the railroad field as a whole uses more than 1,000,000,000 pounds of copper. The average locomotive contains 4300 pounds, the average Pullman car 2800 pounds, a day coach averages 1200 pounds and there is 160 pounds of copper in the average freight car. There are more than 23,000,000 pounds of the metal in the electrification of the Rocky Mountain, Missoula & Coast Division of the Chicago, Milwaukee & St. Paul.

The marine field, always a very large consumer of copper, offers increased potentialities for the metal not only in the constant modernization of existing ship tonnage but also through the race to gain the coveted blue ribbon for speed, luxury and spaciousness. Giant liners larger than anything afloat are either under construction or in prospect. The amount of copper that goes into the construction of a great ship reaches amazing figures.

One of the interesting facts disclosed by a new survey of the Association is that a modern 30,000 ton vessel may be as much as one-tenth copper and its alloys if these metals are used for all appropriate parts. The new North German Lloyd liner "Bremen" and her sister ship the "Europa" contain more than 5,700,000 pounds of copper, brass and bronze.

A striking feature of the "Bremen" is the new use of brass and bronze in marine construction for decorative effect. These rust-proof metals are points of high-light and relief harmonizing with the modernistic note which is conspicuous in the decorative treatment of the ship's passenger quarters.

Lending themselves to the expression of the modern motif in decoration is quite characteristic of the adaptability of copper, brass, and bronze to fit in with various phases of progress. When science brings some new invention or appliance into the service of the public inevitably it seems that functioning becomes dependent upon copper. The radio impressively illustrates the point.

A Copper & Brass Association survey indicates that American homes got their radio entertainment very largely through the instrumentality of more than 50,000,000 pounds of copper entering into the construction of radio sets during the past two years. And copper is, of course, indispensable to the service of the broadcasting stations. It has been estimated that there is a potential market for some 26,000,000 radio receivers in this country alone which is merely another way of saying that promotional effort by this aggressive new industry plus the popular appeal of its product will mean continuing expansion for some years to come. Naturally this indicates an increasing outlet for copper and brass which are superior metals for radio service.

Turning to another illustration, let us consider that new infant prodigy in the industrial field—the automatic refrigerator. When science first demonstrated that ice could be produced artificially it required only a little imagination to vision the time when homes would be equipped with their own ice plants.

That day is with us. Residential buildings in large cities, New York particularly, are being equipped with automatic refrigerators at a rate that is bewildering. It is entirely in order to contemplate a time, possibly not far distant, when every new home, new apartment house and even many offices will have their miniature ice plants as standard installations. Here again copper has much to do with the functioning of this latest contribution of science to the convenience of living. Automatic refrigerators, both gas and electric, depend on copper for efficient service from vital parts such as coils and tubes. In the case of the electric machines their power is furnished over copper wire.

The Association reckons that more than 30,000,000 pounds of copper entered the construction of automatic refrigerators manufactured in 1928. The potential market for these refrigerators can be estimated in millions of units and while a tremendous number has been installed it no doubt can be safely stated that the surface of the market has been little more than scratched. From this can be inferred the extent of the outlet in this field for copper.

Progress in a reverse direction has given the home an oil-fired heating installation. Sales of household oil-heating apparatus are estimated at 100,000 units a year with a potential market open to the industry reckoned in millions of units. Copper, mainly in the form of its alloy, brass, is used for approximately 100 parts of the various

assemblies in the several types of equipment. A survey made by our Association shows that approximately 5,000,000 pounds of copper are now being consumed annually in the manufacture of oil-burning installations and the industry still has its great opportunities ahead. As ingenuity and invention bring new forces and new appliances into public service, copper can justifiably be termed "the world's most useful metal."

Zinc

By

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American Zinc Institute

New York

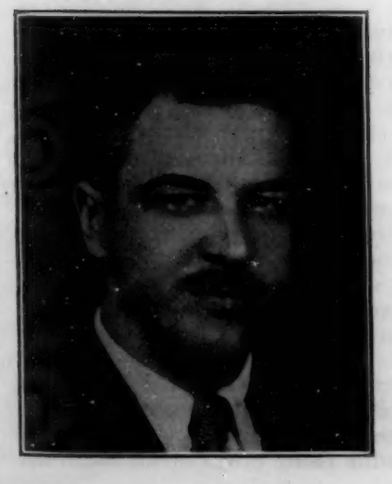
FOLLOWING the post-war depression of 1921, each succeeding year has witnessed an increase in the world's output of zinc, and the year 1929 proved no exception. Total output for the year is estimated at 1,605,000 tons, an increase of about 2 per cent above that for 1928.

World consumption of zinc did not quite keep pace with the increased production, and in the last few months of the year a severe decline in price took place. The London price dropped from £29 per long ton to a little below £20, the lowest figure in over twenty years, and this started a corresponding drop in the St. Louis price, which had held close to 6.80 cents per pound from the first of April until the middle of October. The decline in this country was first made necessary by the threat of foreign importations, which at prevailing prices could have paid the duty and undersold the domestic product; but the impetus of the movement carried the domestic price below the import equivalent, to a low point of 5.45 cents, which was also the low point previously reached in March, 1928.

The productive capacity of the American zinc industry is considerably in excess of domestic requirements. Of late, however, the output of both zinc ore and metal has been severely curtailed, and present low prices make it difficult for many mines and smelters to operate. While stocks of zinc in the hands of producers have increased from 45,441 tons at the beginning of the year to 77,000 tons at December 31, this latter figure represents only about seven weeks' supply, and stocks in consumers' hands are known to be low.

For 1930 the prospects for zinc depend largely upon the degree of activity in industries which consume this metal. Approximately two-thirds of the zinc consumed in the United States goes into zinc-coating (galvanizing) of steel and the making of brass, while the zinc pigments, zinc oxide and lithopone, account for another twenty per cent of the total. All of these products will evidently be benefitted by the program of building construction and general activity projected in recent national business conferences. New uses for zinc are also being developed, particularly in the field of die-casting. The use of sheet zinc for roofing and other purposes, which has consumed a large tonnage of the metal in Europe, has lagged behind in the United States due to lack of knowledge of the excellent qualities of properly applied zinc roofs. To correct this condition, a "Zinc Workers Manual" was issued by the American Zinc Institute in the past year, giving detailed information on the proper methods of construction and the places in which zinc can be used to advantage for roofing and other sheet metal work. A general campaign of research and market extension, to increase the consumption of zinc, is also proposed but has not yet been underwritten.

In Europe, the Zinc Cartel which was formed in May, 1928, for the purpose of controlling production, has been abandoned and efforts to bring the producers together have been without success. The present overproduction and low prices have brought reports that certain zinc smelters will shut down in the near future, and that some of the mines supplying zinc ore may also suspend shipments. The outlook is uncertain, though it does not promise immediate improvement. This situation, of course, affects the American market only indirectly, because of our tariff protection and the ample ability of the American zinc industry to supply all domestic requirements.



Tin

By
C. L. MANTELL

Consulting Engineer

New York

THE year 1929 has witnessed decreasing prices for tin metal with the resultant establishment of a minimum price for the last five-year period. Tin metal has been falling in value since the early part of 1927, the price curve being generally of a downward nature.

The year has brought forth continued activity and interest in plans for the stabilization of prices, curtailment of production, grouping together of producers, changes and strengthening of control, as part of the general scheme on the part of the producers to relieve themselves of the consequences of overproduction and low prices for the product. We have heard much talk of research and the development of new fields of application for tin metal in efforts to increase the demand. This attitude is in marked contrast to the views expressed only a few years ago which indicated by their tone that demand was to be expected to be largely in advance of

supply and that the available supplies of tin in the shape of ores were being used up and would gradually in the near future be exhausted. Large sums of money have been invested in efficient dredges capable of treating leaner gravels profitably, with the consequent replacement of older inefficient methods by those allowing the recovery of higher percentages of the tin contents in the ores.

There has been a general dissatisfaction with existing tin statistics which have been described as chaotic, with little agreement by the separate bodies collecting the data as to the methods of compilation, material to be included, the definitions adopted, or the dates of publication. Steps are being taken to provide the tin industry, from mining at one end to consumption at the other, with statistics and information that will be of value.

Tin imports into the United States from foreign countries for the first eleven months of 1929 were 83,370 tons as compared to 71,710 for the corresponding period in 1928 and 67,955 in 1927. These figures indicate an increase of nearly 19% over the corresponding period in 1928. To judge from the imports of tin for October, over 80% of the metal came from British Malaya and more than 10% from the Netherlands, the remainder coming from England, Australia, and China, with only a small proportion from other countries.

As in former years, the tin plate industry has been the largest consumer of tin metal. The year 1928 established the new record for world demand for tin plate, as judged by combined American and British exports. On the basis of monthly averages with combined exports of the United States and Great Britain in 1929 up to November 1st, it appears that the world demand was 7% more than last year, and that another new record will be made. On the basis of statistics collected in recent years, about 22% of the tin plate manufactured is consumed in the form of cans used for packing vegetables and fruit, 13% for milk, 5.5% for fish, 4.5% for meat, 3.5% for syrups and molasses, 2.4% for butter, lard and compounds, 2.3% for baked beans, 1.5% for soups, 1.4% for baking powder, 1.3% for crackers, 1.2% for coffee, tea and substitutes, while miscellaneous foods, spices and oils accounted for 4%. Containers for oil and grease are responsible for 7%, while tobacco, cigars, cigarettes, and snuff containers consume 4%, paint and varnish containers 1.6%, and pharmaceutical drugs 1%. From 16 to 17% of the United States production of tin plate is exported.

Aluminum coated steels have been brought forward as a competitor for tin plate. The German plant of the Stahlwerk Hoesch at Stockheide which was built for the production of these sheets is expected to be in operation during the early part of 1930. Aluminum cans are being experimentally used as competitors for tin cans in Norway as well as in other countries on the Continent, but in the United States little attention has been paid to their possible application. Some attention has been directed by the metal producers to the possible application of nickel in the form of cans for the preserving of foods. At the present time this work is still in the experimental stage. The effect of these new developments on the tin plate industry in its canning applications has been negligible.

The merger movement so prominent in other industries and organizations during 1929 has brought forth in its train mergers in the can making field. One example is the Continental Can Company which in the past two years has acquired the business and assets of 16 companies. They now operate a total of 35 plants in 24 cities of the United States and Cuba, including a tin plate mill, three plants for the manufacture of can making machinery, and laboratories for research in canning and can manufacturing. The other large organization manufacturing cans has entered the British field.

Over a ten months' period the total apparent Babbitt metal consumption for 1929 was 57,231,198 pounds as compared to 49,060,406 in 1928. While there has been a considerable amount of development and research work in connection with the replacement of the tin in Babbitt metal, bearing metals, and solders by other materials, present low prices for tin metal have served as a deterent rather than a stimulus to continuance of the work. New demands for other uses of metals formerly proposed as substitutes for tin, particularly cadmium in cadmium-lead-tin alloys, have resulted in shortages of these substitute metals with their consequent elimination from competition with tin.

Judging from the financial reports of one of the largest detinning companies, one of the most successful years both from the amount of material handled and from the profit viewpoint was encountered in 1929. A little less than 200,000 tons of tin plate scrap are treated annually at detinning plants. A source of difficulty in recent years for the detinners has been the decreasing amount of tin metal per ton of tin plate scrap. In 1929 the pounds of tin metal per ton of tin plate is expected to be about the same as in 1928,—that is, approximately 33.3 pounds per gross ton, as compared to 32.55 in 1927. Recovered steel scrap from detinning, usually compressed into bundles and shipped to steel mills for remelting purposes, is worth about 90% of the market value of heavy melting steel scrap. Higher prices are paid for tin plate scrap for delivery to seaboard points because of the keen competition in the seaboard territory for such supplies to be shipped to Germany and Italy where the detinning companies are having increasing difficulty in obtaining sufficient supplies.

As a result of the development of other industries, particularly electrical refrigeration, the electrodeposition of tin has become an increasingly important minor consumer of that metal. Despite the competition of other metals, the consumption of tin in hot dipping small articles has kept pace with the growth of population. Tin foil, however, has had to meet the severe competition of its competitor made of aluminum, while the same has been true to a lesser degree of tin tubes, although low prices for tin metal have at times prevented this competition from being as severe as it might be. In connection with aluminum, however, in its application to foils and tubes, research and propaganda have been carried forward at a steadily increasing rate, while nothing of a comparative nature has been done for tin tubes and foil.

Consumption of tin metal as a material of construction in the chemical engineering industries has been negligible save in a few cases in connection with the manufacture of pharmaceutical products.

Consumption of tin chemicals, particularly the tetrachloride and other salts used in the textile industry, is expected to show a much higher figure than 1928. It has been stated that at times large consumers of stannic oxide could not readily fulfill their requirements, again a result of newly developed industries such as electrical refrigeration where the stannic oxide enters the enamels of the cabinet. There have been some attempts to develop a production of stannic oxide from secondary alloy metals containing tin.

From all angles it is very likely that the year 1929 will be considered a most interesting one. Not so many years ago the tin producer was extremely complacent. This was not surprising when the steadily rising prices of the metal up

to 1927 are considered. Considerable propaganda had been organized after that time and money spent to demonstrate the approach of a tin famine. As a result, consumers were startled and many new tin companies were promoted. Other properties were modernized and mechanical methods of mining replaced hand methods. The situation has now been entirely changed in that in 1929 the lowest price for tin metal in a five-year period has been reached, and it appears that overproduction rather than overconsumption is in need of an adjustment. Many schemes have been brought forward for "control" of the tin market or regulation of production. It appears at the end of 1929 that, through financial rearrangements, absorption of some of the smaller companies by larger ones, and mergers of different kinds, the tendency of the tin industry is to pass into strong hands which will attempt in some manner or other to regulate supply to fit demand and level out the erratic ups and downs of production and price of the metal which is so important in the national economy of so many countries. Continued low prices of tin throughout the year have markedly slowed down and in some cases entirely removed the stimulus to search for substitutes for the metal. The tin producers are now becoming aware of the fact that they must needs study their markets, develop new applications for the metal, and become "research conscious." To date much of the energy has been spent in organization and conversation along these lines, but it appears that research organizations somewhat similar in type to the Copper and Brass Research Association will actively function in connection with the tin industry.

Lead

By

FELIX E. WORMSER

Secretary, Lead Industries Association,

New York

THE lead industries as a whole have just completed a generally prosperous year. Production of lead in the United States, estimated at 678,000 tons in 1929, showed an increase of slightly more than 4 per cent over 1928, with world production showing a record in 1929—1,930,000 tons.

At the same time, the price of lead averaged approximately a half cent higher than in the preceding year, when it averaged 6.30c per lb. New York. The Mexican unsettlement in the early part of 1929 temporarily interrupted supplies of the metal from that source and sent the prices soaring to 7.80c. This stimulated production in the United States and, when Mexican lead was again able to move freely, the increased production failed to move into consumption, causing an increase of stocks in the Fall to about twice what they were in the Spring. This of course depressed the price of lead and brought it to 6.25c. Consequently many producers curtailed production in the last two months of the year so that the situation is correcting itself, as consumption continues at a good rate.

Technically there have been several rather interesting developments during the past year. Admirable work has been done by G. L. Oldright and Virgil Miller of the Bureau of Mines in a very complete experimental study of lead blast furnace operations at the International Smelting Company's plant at Tooele, Utah. They plan to continue this work elsewhere, but the results of the work so far, published by the Bureau of Mines, contains much information which should lead to better blast furnace operation.

A lead-calcium alloy which is finding wide use as cable sheathing has recently been developed. The addition of a very small amount of calcium to lead gives an alloy of high fatigue strength which is resistant to failure from reverse stresses such as are often encountered in cables due to expansion and contraction.

Lead linings are now being extensively used in the chemical industries, principally because of developments which have produced better products. The secrets of the various processes of manufacturers making lead-lined equipment are usually carefully guarded, but the fact remains that the product has been improved. Could production costs be lowered, these products would find even a wider field of application. Large amounts of antimonial lead sheet are used as tank linings in the chromium plating industry, and it has been found that if these tanks are put into use immediately or if they are given anodic treatment at regular weekly intervals, the life of the lining can be extended.

Lead coated copper is finding growing favor for architectural purposes such as roofing, leaders and gutters. It has the advantage of the strength and durability of copper plus the protection and durability of lead. Moreover, it furnishes a pleasing gray color, one which will not discolor, and is less expensive than antimonial or soft lead. This gives it a wide field of application on moderate priced dwellings where lead is considered too expensive. Here it is interesting to note that results of tests on the corrosion of metals by city air conducted in England and reported by J. Newton Friend place antimonial lead at the top, followed by the highest grade of tin and then soft lead. Other metals, common tin, stainless steel, aluminum, copper and so on, follow.

The Bureau of Standards is doing considerable research work on lead bearing metals at the request of the Assistant Secretary of War with the idea of replacing tin-base bearings with lead-base for the purpose of conserving tin. E. J. Hall of the Hall-Scott Motor Car Company, reports that they have found that a bearing composed of 25 per cent lead and 75 per cent copper, having no lining or backing but a uniform structure throughout the shell, will give from 100,000 to 150,000 miles of intercity motor-coach service without attention.

The use of a baked red lead priming coat under asphaltic or bituminous protective coatings on underground pipe lines has only received general attention in the last six months, although such a coat has been successfully used in isolated instances for several years. This red lead coat has been entered in the tests of coating materials being conducted by the American Gas Association and the Bureau of Standards and should give a good account of itself judging by past performances. This may open another large market for red lead.

Economically, most of the lead industries are in a happy

condition. Two electrical uses, storage batteries and cable coverings, are the largest consumers of lead, and both of these industries have shown healthy growth during the past year.

The record automobile production has been reflected in increased demand for storage batteries, while the use of batteries for other purposes such as industrial trucks, locomotives and lighting has also expanded. While 1930 is not likely to be a record year for the automobile industry it is believed that production will continue only at a slightly lower rate below 1929. An important feature of the battery industry is the stabilizing influence of its tremendous replacement market.

Cable sheathing, which in 1928 used 180,000 tons of lead, increased that consumption to about 200,000 tons in 1929 as nearly as can be estimated. Telephone and other utility companies have all announced large expenditures for expansion in 1930, making the outlook for this market for lead particularly bright.

Lead paint pigments, from figures now available, seem to have slightly more than held their own with the possible exception of white lead in oil, the demand for which has been steady.

Other uses of lead, such as bearing metal and solder, are intimately connected with general business conditions. They experienced a good year in 1929, and are not expected to show much change in the first part of 1930. Lead products used in building construction such as pipe, sheet and caulking lead, should show improvement with a better building situation. Such an outlet as ammunition manufacture usually exhibits little variation from year to year.

Aluminum Gains in Old and New Fields

By S. K. COLBY

Manager of Sales Promotion, Aluminum Company of America

NINETEEN twenty-nine has been a good year for aluminum and its strong alloys. Old established fields for the metal have shown growing demands, new uses have developed, and an advance in the fabrication technique of aluminum has widened its application in the light weight manufacture of large structural units.

Among the new applications that have flourished during the past year has been the employment of aluminum for spandrels and other decorative castings for office buildings, churches and public offices. Because the new architectural mode has come to recognize white metal ornamentation of buildings as a definite method of treatment in keeping with modern design trends, this demand for castings should be steadily attractive to aluminum foundries.

Castings and sheet work for oil tanks and apparatus have grown in use during the past year, because of aluminum's resistance to corrosion in contact with high sulphide oils and gases. The development of an adhesive that satisfactorily holds foil on metal surfaces has created aluminum "foiling" as a means of protection, for tanks, tank-cars, pipe lines, etc. Due to its high reflectivity of the sun's radiant heat, the foil surface is also being used on oil tanks to reduce evaporation losses when applied to oil tanks and cars.

In connection with the fabrication of strong aluminum alloys, the most important feature of 1929 has been the production of structural shapes of a size hitherto beyond manufacturing ability. Beams and angles up to 14 inches in depth and 85 feet in length are now made in heat-treated alloys to supply structural members for buses, trucks, street-cars and railway coaches.

In the paint field, research has found that aluminum is peculiarly well fitted as a pigment for priming coats on wood, due to its ability to seal out moisture. Aside from its new growth in use as a wood primer, aluminum paint showed a steady increase for the year in its established uses.

All-metal airplane construction has greatly favored the increased consumption of aluminum in aviation. "Alclad" sheet, for wing and fuselage surfaces and for pontoon and sea-plane hull construction, shows a most favorable increase in demand. The new Navy dirigible, ZMC-2, unconventional in its construction, uses a single wall of thin "Alclad" sheet, over a framework of strong aluminum alloy members, to replace both the usual gas container walls and the customary outer skin of treated fabric. As for aviation engines, there are surely no better examples of what may be done in forging, casting and heat-treating aluminum.

Aluminum furniture continues its growth in production. Although wood-grain finishes are standard, the "white-metal" vogue in modern architecture and interior decoration has induced some demand for aluminum chairs in the natural finish of the metal. Finish-hardware in aluminum is now available from one of the leading manufacturers in that specialized line.

The new year promises, for aluminum, the healthful combination of a consistently maintained demand in long-established outlets and the most encouraging prospects of tonnage in new territories.

The Foreign Aluminum Situation

Dr. Robert J. Anderson, in a review in the "American Metal Market," New York, says:

The aluminum industry of Europe has been in a generally satisfactory condition, in fact much better than might be expected in view of the economic situation there. Conditions have improved considerably in France, while the German industry has been operating efficiently and profitably.

Trade in England has been good but some severe competition has been felt from American products in the home markets. This competition has been especially marked in finished and semi-finished manufactures. In the foreign export markets, European makers of finished products have felt keenly the effects of American competition.

On the whole, the European Aluminum Cartel has continued to function well. As will be recalled, one of the outstanding principles of the organization has been that of gradually lowering prices. This caused some dissension last year among the members. It would be unfortunate if the controversy led to dissolution of the cartel.

The Nickel Industry in 1929

By F. S. JORDAN

Sales Manager, The International Nickel Company, Inc., New York

WORLD consumption of nickel continued to expand during 1929 and the peaks established during the war years of 1916 and 1917 were exceeded for the first time. Somewhat improved industrial conditions in Europe influenced favorably the foreign consumption, and the exceptionally high scale of operations in the United States undoubtedly accounted for much of the increase in domestic demand. It is probable, however, that the extensive research and development work constantly being done on nickel and its alloys, and the widespread publicity given the results, are playing an important part in maintaining this steady expansion.

Although alloy steels are still the largest outlet for nickel, materially increased quantities are now consumed for applications considered relatively unimportant not so long ago. The diversified and rapidly expanding market for nickel alloys is also most encouraging. Large quantities are used in the construction of railroad equipment, agricultural implements, tractors, road and building contractors' equipment, and similar heavy duty machinery. There are also indications that marine and general power plant equipment offer attractive potentialities.

The use of nickel in the production of alloyed cast iron has more than doubled every year for the past five years, and during 1929 attained substantial proportions. The success of this development has led to the initiation of a development along similar lines on the use of nickel in the brass foundry, and preliminary research work is now being done to determine the improvements secured by the addition of nickel to brass, bronze and aluminum.

Nickel has also profited by the rapid strides made in the science of electroplating. Automatic conveying and plating equipment is now quite common and the more progressive plants operate under close technical control. This has led to the adoption of more suitable standards and an appreciation of the materially increased rust resistance of relatively heavy nickel deposits. The widespread use of chromium plate super-imposed on heavy coatings of nickel or nickel and copper, and the growing practice of nickel plating before enameling to get double protection against rust, have substantially increased consumption of nickel anodes during the past year and there appears to be still room for substantial progress in this field. The high purity anode, containing not less than 99 per cent. nickel, continues to increase in popularity and the bulk of the anodes now produced are of this type.

While there are numerous applications for which properly deposited, reasonably heavy coatings of nickel or nickel and chromium are entirely satisfactory, architects have for some time felt that a more permanently attractive material was required for plumbing fixtures. After a thorough investigation the United States Government has recently adopted a white bronze containing a minimum of 18 per cent. nickel as one of their master specifications. This alloy will no doubt be used extensively for plumbing fixtures in connection with the $423,000,000 building program recently advocated by the Treasury Department. Prominent producers furnishing plumbing materials for these projects plan to exploit solid nickel silver plumbing fixtures of this analysis for all monumental type buildings. Their permanently attractive color would undoubtedly be a valuable asset in construction of this type.

Another application of nickel that has increased materially in popularity is that of heat resisting alloys of the nickel chromium or nickel chromium iron type. These are now widely used, in both cast and rolled form, for heat treating equipment and other high temperature applications. The increasing popularity of electrical energy, both for industrial and domestic thermal equipment, should further stimulate the consumption of such alloys. The increasing use of electrical energy has also directed considerable attention to the ferro nickel alloys of the high permeability type. These alloys, containing 45-80 per cent nickel, have already been extensively used in communication equipment and are now being seriously considered for light and power apparatus and accessories. As about 90 per cent. of all electrical equipment contains a magnetic circuit, their potential field of application is great. If widely adopted, the high average nickel content of these alloys would assure a large outlet for nickel.

Another group of moderately high nickel alloys, the nickel bearing stainless irons and steels, also shows great promise. Alloys of this type are now being extensively used in the petroleum industry and the producing mills report an exceedingly active demand for all commercial forms for oil refinery and chemical equipment.

It would appear, therefore, that the prospects for continued expansion of the nickel industry are quite bright. To assure adequate supplies of high grade raw materials production facilities are being materially expanded. The Frood Mine, one of the largest known ore bodies in the world, is now producing, and the present smelters at Copper Cliff and Coniston, Ont., are being materially enlarged and thoroughly modernized. They should be in operation shortly after the middle of the year, by which time the production capacity of the Port Colborne Refinery will also be greatly enlarged.

The bulk of the output from this refinery will be electrolytic nickel. This is the purest form of nickel produced in commercial quantities in that it is carbon and sulphur free and has an average nickel content of about 99.95 per cent. (including .30-.40 cobalt.)

Use of Mill Products in Monel Metal and Rolled Nickel Expands

By J. F. McNAMARA

Sales Manager, Monel Metal and Rolled Nickel Department
The International Nickel Company, Inc.

THOUGH the use of mill products in Monel metal and rolled nickel for industrial applications continued to show the steady growth which has been marked since their first introduction as commercial products, the outstanding development of 1929 has been the expansion of use of Monel metal in the architectural and household fields.

Until recently this important nickel-copper alloy has

found its greatest markets chiefly in industries where the demand has been for a metal combining great strength with rust and corrosion resisting properties which enable it to withstand the action of many acids, alkalis and similar corrosive agents to which most metals are susceptible. These have covered, of course, a wide range of applications including such vastly divergent industries as metal pickling, drug manufacturing, meat packing, and textile dyeing. Not associated with any industry in such groups but nevertheless a commercial application as distinguished from household uses have been the installations in the hotel and restaurant field, where food service equipment of Monel metal has been featured for a number of years.

The same properties which made Monel metal essential for so many industrial and commercial purposes have been responsible for the growth of its market in the household field, both as a decorative and a utilitarian feature. The leading development in this direction has been in the production of kitchen and pantry sinks, cabinet and table tops, and other items of equipment for which the modern housewife demands a material that will wear well, look well, and fit readily with any color scheme, as well as one that is easy to clean and keep clean. These demands have grown to such an extent that a number of large manufacturers have begun the production of sinks on a standardized basis. In numerous apartment houses erected during the past year, kitchen sinks of Monel metal have been used throughout, more than fifty going into one new co-operative dwelling in Brooklyn.

The market for Monel metal decorative features has been given impetus by the tendency of modern furniture designers and interior decorators to use lighter colors for brightening up living rooms. The metal is now being specified extensively for fire places, fire place screens, mantel pieces, lighting fixtures, door kick plates, chutes and other laundry apparatus and many similar purposes.

Not so recent as decorative installations in the home, but nevertheless reflecting a tendency which has become more and more pronounced during the past year, has been the application of Monel metal to decorative effects in architecture, especially in office buildings. Almost fifty thousand pounds of this metal went into the new Union Trust Building in Detroit, its uses including not only the more common applications for elevators, doors, grilles, and the like, but also for check desks, counter screens, information booths, and all ornamental metal detail in the main banking room. A notable inclination to combine Monel metal with brass and bronze for decorative purposes both in exteriors and interiors has also been made widely evident, especially in the design of banking offices and office fixtures and fittings.

One of the most interesting applications in 1929 was in the building of the new North German Lloyd liner, Bremen, in the construction of which more than seventy thousand pounds of Monel metal were used for food service equipment, turbine blading, and other purposes. A like amount is going into the Europa, sister ship of the Bremen, which is expected to make her maiden trip early next year.

The market for rolled nickel has grown apace. The development of the screen grid radio tube has increased the importance of nickel to that industry since a fine nickel mesh is an essential part of the new tube. In fact, all radio tubes are constructed with nickel for the interior metal parts. Anchor wires on all electric light bulbs are made of nickel.

In the dairy field the use of nickel-lined truck tanks for the transportation of milk and the increasing popularity of other equipment made of pure nickel, has caused a greater demand for the metal than previously experienced. Other industries, especially those manufacturing food, and chemical products, have likewise reflected an important widening of the nickel market.

Secondary Metals

By
THOMAS A. WRIGHT

Secretary and Technical Director

Lucius Pitkin, Inc.,

New York

PROGRESS in secondary metals in the year just closed appears to have been along even more satisfactory lines than 1928, the report and statistics of which were given out by the Department of Commerce as early as July. Indications point to total values, of well over $300,000,000, for the past twelve months indicating the tremendous economic importance of the business.

Increase in tonnage, value and efficiency of recoveries, has been the order of the day, but of far more interest from the viewpoint of the future (the chief warrant for writing or reading a review), is the increased interest taken by the large industries in the prevention and limiting of scrap formed on the one hand, and its further contamination on the other.

The year 1929 has shown marked progress along all the lines mentioned, evidenced in part by the continued activity of the Salvage and Reclamation Section and the Metal Division, of the Association of Waste Material Dealers, who held two well attended meetings, one last March in Chicago and one fall meeting in New York: the recent convention of the American Electric Railway Association, at which the Purchase and Stores Division rendered a report on classifications of both ferrous and non-ferrous metals; and last but not least the secondary metals symposium held at Cleveland in September during National Metal Week.

This meeting, a report of which appeared in METAL INDUSTRY for October, was held under the auspices of the Institute of Metals Division of the A. I. M. E. and was one of the most popular sessions of the week. The papers on the reclamation and utilization of metals such as copper, tin, lead, etc., received wide notice.

With the salvage departments in large plants gradually being put into the hands of highly trained men, the tendency being towards employing those with engineering or chemical education, and with the greater control being exercised by the metallurgist and chemist in the casting and working of the non-ferrous metals, we have had this past year added factors working against the production of unneccessary scrap.

Copper

In general, copper as an example, only goes to a refinery, for three reasons:

(1) That it is too impure to be used otherwise.
(2) That it is surplus material.
(3) That a quick turnover with profit may be possible.

This year has seen an unusually large proportion of the second and third types thus handled; once in the early spring when the price of copper reached its peak and again in the closing months of the year when the business outlook was uncertain, many dealers feeling that a drop in price of the red metal was in the offing. At both times refinery facilities were taxed far beyond their capacity to absorb readily.

According to figures submitted by the Copper Institute to the conference called recently by the U. S. Chamber of Commerce at the behest of President Hoover, the domestic consumption of copper for the first ten months of 1929 was 942,500 tons as against 768,489 tons for the same period in 1928, an increase of 22.60%.

Refinery receipts of scrap material, containing copper in percentages ranging from a minimum of about 7%, as in tailings, to the highest grade known as No. 1 Copper running 98.50% and over, however, show an increase (based on some figures recently published), of over 50%. The total receipts, for the eleven months ending December first, 1929, were 135,291 tons against total receipts for 1928 of 94,441 tons.

That the amount of secondary copper handled throughout the entire country has increased to any such marked degree as would be indicated by the percentage given in the preceding paragraph is doubtful, however, as it would seem likely that due to the rising tendency in the price of copper during the fall of 1928, and an expected drop in price during the fall of 1929, that metal that would normally appear in 1928 on the one hand, and 1930 on the other, was offered to the refineries during the two peak periods mentioned.

As the consumption of metals increases with business activity in general, so must the production of scrap; but the large companies such as the electrical, automobile and allied lines together with the railroads and public utilities, are alive as never before, to the need of reducing costs so that salvage and reclamation operations are affecting the price of primary, as well as secondary copper, just as they do iron and steel.

Once a metal becomes of secondary character (using the term in its generaly accepted definition which includes that of articles which have served their usefulness as well as that of by-product origin) it should gravitate towards that industry which can employ it most economically. This requires reclassification, and improvement along these lines has been noticeable in both types. There is still, however, much needless money being spent for freight and smelting charges for iron and moisture, with the added disadvantage of increased sampling costs and lessened sampling efficiency.

One of the noted matters of interest for 1929 has been the marked tendency for the dealers in copper, lead, and tin bearing material, to sell on sampling and analysis, in which respect they have gone far ahead of industrial plants in general, although here too, an added number of large concerns are beginning to follow this desirable practice, some in an experimental manner, others wholeheartedly.

Although no figures were at hand at the time of writing, there apparently has not been as much competition with Europe this year as last, at least for the last half of the year, taking secondary metals as a whole. Certainly exports have decreased for scrap copper and are negligible for scrap lead, but Germany has been actively in the market for nickel, and together with England, for tin as well.

Scrap brass imports increased in tonnage and in value.

There has been a renewed tendency towards concentration of the business into the hands of fewer secondary smelters and refineries, as well as dealers. Long freight hauls and the necessity of more efficient grading, sorting and loading, all operated this year, as rarely before, towards that end.

There has been continued efficiency among the large producers of brass ingot, in cost accounting, accumulation of data leading toward the simplification of specifications, and the application of improved methods of utilizing scrap, as well as in reducing the amount formed. A new rotary-melter of the gas-fired retort type for small foundry melting of brass, has attracted attention, as many advantages are claimed for it. Cupola melting has continued to increase; gases and impurities in melting, subjects which have a decided bearing on the question of utilizing secondary metals, have been actively investigated this year.

The results of some of these investigations, brought to fruition during 1929, are to be presented and discussed at a symposium held in February, by the Institute of Metals Division of the A. I. M. E. in New York.

Lead

During the past year, developments along metallurgical efficiency in the treatment of secondary lead appear to have been confined chiefly to obtaining a more accurate picture of the health hazards involved, and continued study of the biggest and most important item, the subject of metal losses in handling battery plates.

Dealers appear to have a better appreciation, in a few districts, of the advantages to be obtained by taking proper precautions against moisture and inclusion of mud. It would not be advisable to have battery plates too dry, from the health viewpoint, but that contingency is quite remote.

Heavy tonnages have been sold on sampling and analyses, either wet or fire, and it is quite probable that the day is nearer when the old method of purchasing on N. A. W. M. Dealers' specifications will be used only for small lots sold to carload shippers.

A number of the terms used in valuing scrap metals, particularly those of special interest to lead and tin, were defined and clarified in a report submitted during the year by a committee of the National Association of Waste Material Dealers appointed for that purpose. This report was laid over for further consideration and comes up for final action at the coming meeting in March. As there have been no objections so far, it is assumed the report will be accepted.

Lead-covered power and telephone cable is becoming a factor of marked importance as a source, not only of lead, but copper also, particularly in the large cities where replacement is so necessary, due to insufficient capacity of the older types.

Nickel

The steel industry continues to absorb quantities of nickel bearing material, but Germany, until just prior to the close of the year, was taking considerable quantities of secondary scrap suitable for refining, particularly that which was copper bearing, payment being made for both metals. A certain amount of nickel appears in copper and zinc bearing scrap at the refineries, but not only is it not paid for, but may, and often does, carry a penalty.

Increased use of nickel in the non-ferrous as well as the cast-iron foundry has accounted for more of the secondary metal produced. A number of instances have occurred where dealers have purchased skeleton scrap and clippings for monel, and found them to be Ascaloy or Allegheny metal, and the inability to readily distinguish some of these alloys has restricted the trading somewhat.

Zinc

Zinc closed the year affected by the pessimism of the primary zinc industry. The low prices prevailing hinder an efficient recovery or treatment of many types of material, such as certain zinc base die cast scrap, containing more or less all of the secondary metals mentioned in this review. New processes involving zinc scrap, of certain limited classes, are absorbing some additional amounts, but large tonnages of the metal are still being lost by volatilization, etc., from scrap brasses and the like, being treated for recovery of the copper values. At one copper plant handling copper bearing material, considerable zinc oxide is being recovered from the fume, but improvements put into effect during the year are along the lines of mechanical handling, packing, and in quality rather than in percentage of recovery.

Tin

This country has had keen competition from Germany, and from England, which will take drosses, but the domestic consumption of ordinary tin wastes appears to have been considerably greater than the preceding year, except possibly in such items as tin paste, etc. High moisture content of the latter naturally works towards domestic consumption, but nevertheless Germany has been an active bidder.

An outstanding development of the year has been the heavy increase in tin bearing copper material, now handled at one of the large copper refineries on the Atlantic seaboard on the basis of payment for tin, as well as copper in certain types of material.

Details are not available as to the process, which is still in the development stage, but it is known that an increased tonnage of a high grade of solder is being recovered. While the solder recovered from sweated radiators had also shown an increase in amount, the tendency towards lower percentages of tin in the solder used originally has also continued.

Antimony

A review of antimony from secondary sources is so tied to that of lead that little can be added in a short review, except there appears to be renewed interest on the one hand in government circles in conservation of the metal, because of our dependence upon China, etc. for our supply, while curiously enough the secondary smelters are concerned because the antimony recovered is accumulating in a lead-alloy form of undersirable ratio. The Harris process appears still to be in the development stage although it can give at best only partial relief. Development of a lead-bismuth alloy for battery grids of which there is some talk would affect the ratio. Incidentally the ordinary dismantled storage battery shows about 20 lead to 1 antimony.

Aluminum

The close of the year saw little demand but less production also of secondary aluminum particularly because of the recession in the automobile industry. Naturally new types of scrap are being formed but there appear to have been few items of interest available for publication in the field covered by a review. One of those holds promise of developments that will have a marked bearing on future progress, and that is the launching of the Aluminum Research Institute. Formed by a group consisting of the major secondary aluminum smelters, the intent is to make a technical study of the problems of efficient handling, recovery and refining of scrap metal and drosses, to develop high-grade alloys from secondary metals, and devise application methods for such alloys.

The Precious Metals

By

G. H. NIEMEYER

Vice-President,
Handy and Harman.

New York

THE world's silver output for 1929 is estimated at 256,200,000 ozs. which is about 1,100,000 ozs. less than in 1928. The United States' production probably totaled about 60,900,000 ozs., or about 2,500,000 ozs. more than in 1928. Mexico produced 105,000,000 ozs. in 1929, a decrease of approximately 3,500,000 ozs. from 1928 production.

1929 will undoubtedly prove to have been the biggest year in the history of the silver industry. It is estimated that the total consumption in the United States exceeded 36,000,000 ozs., which is an increase of 7 or 8% over 1928.

Sterling silver manufacturers used more silver in 1929 than ever before. Despite the relatively large production of pewter hollow ware, silver plated ware as a whole enjoyed an excellent business in 1929 and consumed more silver than in 1928.

The use of silver in the chemical trade which includes motion picture film and photography will probably show a small increase.

The price of silver showed a decline throughout the year. The New York official quotation on Dec. 31, 1928 was 57⅛c; on Dec. 31st, 1929 it was 46¾c. The highest quotation was 57½c in January and the lowest 46½ (Dec. 30th). The average New York official price for the year was 52.99c.

Gold

The consumption of gold in the arts and industries in the United States and Canada in 1929 will probably show a slight decrease as compared to 1928. In the manufacture of jewelry the demand for the cheaper colored and plated costume jewelry continued in good volume. There was a falling-off in the production of medium priced gold

jewelry but an increase in the optical field. Gold novelties and toilet articles enjoyed a good sale until the last few weeks of the year. The use of gold in the electroplating field continued in good volume. There is a noticeable trend to colored golds.

Platinum

Department of Commerce figures on platinum metals for the first nine months of 1929 showed imports of platinum as 89,455 ozs., an increase of 1,170 ozs. over the corresponding period of the preceding year.

Palladium and iridium imports were considerably higher in 1929 than in the preceding year, the figures for iridium being 3,369 ozs. in 1929 against 1,766 ozs. in 1928, and for palladium 16,742 ozs. against 9,267 in 1928.

The course of prices was steadily downward throughout the year. Platinum decreased from $70 to $61, iridium from $275 to $185 and palladium from $40 to $36. The markets have been dull and uninteresting, and the tendency still seems to be downward.

Expansion Plans for Metal Plants

A recent news item in the daily press called attention to the proposed expenditure of $250,000,000 by the United States Steel Corporation during the next three years, for the expansion of betterments and additions to their plant and equipment. The Ford Motor Company will spend $30,000,000 in 1930 for the same purposes.

We give below the tentative plans of some of the representative metal manufacturers.

The Aluminum Company of America, will spend $50,000,000 in 1930 according to an announcement recently sent out from the company's main offices in Pittsburgh.

American Brass Company, Waterbury, Conn., cannot state to just what extent they will make expenditures for rehabilitation and improved facilities, but they will follow their usual practice of keeping their mills fully equipped with the most modern machinery obtainable.

Scovill Manufacturing Company, Waterbury, Conn., reports no definite plans for expansion of building for the coming year.

Revere Copper and Brass, Inc., Rome, N. Y., has no building program for the next year other than to finish up various pieces of work which were started in 1929. They will probably make the usual capital expenditures for improvements from time to time but they do not know yet what the amount will be in the aggregate. They expect to go along in a normal way in 1930.

Dallas Brass Company, Chicago, Ill., a division of the Revere company, will spend over $1,000,000.

International Silver Company, Meriden, Conn., has laid out a program calling for the expenditure of about $500,000 for the coming year.

Ajax Metal Company, Philadelphia, Pa., anticipates the expenditure of between $300,000 and $400,000 on plant extensions and improvements during 1930.

Casting Lighting Fixtures

Q.—Can you recommend a good book on molding and casting brass lighting fixture parts? We want information on alloys, melting, molding, sand, and casting the above parts.

We are endeavoring to make fixture parts as good as those turned out by fixture foundries.

A.—We know of no book devoted exclusively to molding of brass lighting fixture parts. There are, however, several that deal at some length with foundry practice. One book is "Metals and Their Alloys," by Vickers, price $7.50, and another is "Practical Alloying" by Buchanan, price $5.00. We can send you either one of these books on receipt of purchase price.

What is required in this class of work is good pattern equipment and we would suggest that you get in touch with some pattern company that is familiar with the making of aluminum match plates. When you decide what standard fixtures you want to make, have aluminum match plates made and hire a good foundryman, and with his knowledge you can start on the right method, that is, good pattern and flask equipment.

We suggest that you build six crucible furnaces, either oil or coke-fired. This whole business of making lighting fixtures consists of using proper pattern equipment where castings can be made quickly, cheaply and accurately. The work is mostly made from yellow brass with about ¼ of 1% aluminum added; it is also made of aluminum. The metal should dip well and give good color.

—W. J. Reardon.

Speed of Bristle and Wire Wheels

Q.—Have you any information on file or do you know of a book published that contains the various speeds at which wire and bristle wheel brushes should be operated in various kinds of metal work?

A.—We know of no reference work giving the information required. The use of these wheels finds its greatest application in the various operations incidental to metal plating and finishing.

Bristle wheels are used largely for scouring work preparatory to plating and for relieving of oxidizes, etc. The slower speeds, 600 to 800 r.p.m. are for the larger diameter bristle wheels; up to 1200 r.p.m. for the smaller diameter for scouring; and from 900 to 1400 r.p.m. for the smaller diameters in relieving. For this purpose it is largely a question of the most efficient cutting speed for the particular type of work and finish.

Where bristle wheels are used in the polishing departments, using emery cake or paste for a finishing cut, the speeds may be from 1800 to 2200 r.p.m.

In the use of steel wire wheels for removing sand from castings, 1200 to 1400 r.p.m. is used on brass and bronze and around 2000 r.p.m. on cast iron.

Wire wheels, either steel or brass, used for satin finishing are run at 1200 to 2000 r.p.m., depending on the metals being operated on, the diameter of the wheel, and the degree of satin desired.

Wire wheels, either steel or brass, used for the regular scratch brushing operations are usually operated between 900 and 1200 r.p.m. —Walter Fraine.

Problems in Foundry Work and Refining

By WILLIAM J. REARDON

Refining and Casting Copper Alloys

Q.—We would greatly appreciate advice in regard to remelting borings from red brass and bronze. Red brass is 85% copper, 5% tin, 5% zinc, 5% lead. Bronze is 87% copper, 7% tin, 4% zinc, 2% lead. Borings contain about equal parts of both. Do you know of any refining method that will reproduce metal dense enough to produce a casting that will stand the test of 2,500 lbs. oxygen pressure without leaking? These borings are from castings made of virgin metal from a reliable refinery.

WILLIAM J. REARDON

Associate Editor

We also desire to make yellow brass levers 4 inches long by ⅝ inch wide by ⅛ inch thick, in a permanent mold. Could you advise us as to what course to follow? Also, on permanent mold making for aluminum castings?

We use a gas-fired furnace with number 50 crucible deoxidizing metal, stick phosphorus and charcoal.

A.—In reference to refining red brass borings containing 85% copper, 5% tin, 5% lead, 5% zinc, and also 87% copper, 7% tin, 4% zinc, 2% lead, to get metal that will stand a test of 2,500 lbs. oxygen pressure without leaking; we are not prepared to make any suggestion on refining this class of metal to stand such pressure. This work is best done in a brass forging or pressed brass, i.e., die is made as per casting wanted and a rod of yellow brass is placed in the die of the proper weight and pressed hot. It makes a very suitable casting for such a job.

However, if you want to cast such valves, we suggest you run down your brass turnings and pour in ingots and use as follows: 90% ingot, 7% tin, 2½% nickel shot (50 nickel-50 copper), ½% of 15% phosphor copper. This mixture will not machine like 85-5-5-5 but will stand the pressure required.

In reference to making the yellow brass levers in permanent molds: we would suggest making this article out of aluminum bronze if you desire to pour them in permanent molds, as yellow brass does not work so well in permanent molds and aluminum bronze works well. The method to follow would be to make up your molds in cast iron and arrange your gating, etc., to suit the job.

Permanent molds for aluminum castings: these molds are made similar to molds for aluminum bronze. A better way would be to employ some one having experience in permanent mold work on brass and aluminum.

As to your deoxidizing metal with stick phosphorus, 15% phosphor copper would be better and easy to add to the metal.

Tobin Bronze

Q.—We have on hand a quantity of old tobin bronze shafting to be used as scrap. Castings made from this material are very tough but shrink so badly in casting that it is hard to get satisfactory results. The castings, too, though tough, are a little too soft for general use. What would you recommend as an addition to the tobin bronze scrap to reduce the shrinkage and increase the hardness without too greatly impairing its strength?

A.—We would suggest you make analysis of your tobin bronze which should run approximately: 59 to 63 copper, ½ to 1½ tin, 39 to 40 zinc. Some mixtures contain 1 to 2% of iron. However, make analysis of your scrap. Do not take any notice of the iron or tin and add copper or zinc so that your mixture will contain: 58½ copper, 41 zinc, ½ aluminum. Or take the scrap as you have it and add ½% aluminium and you will come very near the mixture given and will receive a mixture that will be similar to manganese bronze. Make casting in the same manner, and this metal will stand over 60,000 lbs. per square inch.

A method of testing this alloy that is quite useful is to dip out of the crucible before taking from the furnace a small amount of the metal and pour in a strip 12 inches long, ½ inch by ½ inch, and bend. If the metal is tough and hard to break and there is a fine fracture, it is correct. If brittle and coarse grained, known as canary color, add more copper and stir and test until a satisfactory test is taken. This should enable you to use this material to advantage.

Casting Brass Escutcheon Plates

Q.—We are having considerable trouble in obtaining perfect cast brass and bronze escutcheon plates. These plates are large and their surfaces are marred by rough spots caused by sand and dirt. These imperfections are generally on the gated side of the plate. We have used phosphor copper as a flux to get the dirt out of the metal, with poor results.

It may be that a different style of gating will solve the problem, or a different kind of sand. At present we are using Albany sand but are going to try French sand. We use the highest grade casting copper but are going to experiment with the highest grade lake copper.

If you know of any flux or method of gating, or can give us any other helpful information, it will be appreciated.

A.—On examination of the sample casting we find your trouble is shrinkage, and this is due to the gate being too light. Your difficulty can be overcome by increasing the gate. Make it deeper. This, however, may interfere with your casting. If so, we suggest you increase the runner gate and bring the gate close to the runner.

We feel this will remedy your trouble. At any rate, as we see your sample, the trouble is shrinkage which should be eliminated by making the change indicated above.

The Metal Consuming Industries in 1929

Reviews of Progress in Fabrication of the Various Metals and Alloys

The Brass Rolling Mill

By

WILLIAM J. PETTIS

Associate Editor

WHAT have been the outstanding developments in the brass rolling mills during the past year?

This is a question of great interest to those allied to this industry, and an annually recurring one. In the mechanical treatment of copper and the copper-zinc alloys, during their transit into sheets, rods, and tubes, there has been no radical departure during the year now passing, from the practice established during the last twenty years; rather a refinement of those methods, than any new developments in equipment.

Looking backward over a third of a century of brass mill operation, what might be termed major developments in equipment were comparatively few. A revolutionary change in the casting shop, was the introduction of the electric furnace for melting the copper and zinc. This eliminated the old pit-fire method, where coal was used as fuel, and this change is but a little over ten years old. In the rolling mill the automatic blocker was an outstanding change. This machine catches the strip of metal as it passes through the rolls and starts the end around a revolving spool, an operation formerly done by hand, and a very dangerous one.

A milling machine that operates on the principle of a wood planer takes the place of the old "hand scratch" machine used in overhauling the brass bars after the first rolling. This increases production largely, and does better work than the old way. Hardened steel rolls have replaced the chilled iron rolls, in the finishing mills, they are run at higher speeds, and individual drives were introduced. Oil burning annealing furnaces replaced the wood burning furnaces, long a fetich with the brass men.

In the manufacture of brass and copper tubes, the Mannesman piercing machine, a German invention, changed the old method of making tubes completely, as did the extruding machine in the making of brass rods. With the exception of the electric furnace, most of this equipment was introduced in the period from 1895 to 1912, and while the original machines have been vastly improved, there have been few basic changes.

The outstanding developments have been along scientific lines. Laboratory control of the alloying and casting of the metals has assured an accurate proportioning of the metals used in any given alloy, and a perfect "mix". A broader knowledge of the grain growth in the brasses treated at different temperatures, and the developed skill that can control them, has made the annealing of the alloys a vital factor in improving the physical qualities to a point where the metal can meet the exacting engineering demands of today.

An interesting development is shown in the heat treating of seamless brass tubes, to remove the internal stress due to the finished drawing operation. This is accomplished without any perceptible loss in strength and hardness.

The Brass Foundry

By

H. M. ST. JOHN

Associate Editor

A REVIEW of the brass foundry industry during 1929 is a matter of recording trends rather than anything in the way of new or spectacular developments. In general there has been a continuing tendency for small foundries to consolidate into larger establishments, with greater resources and wider markets. Brass castings have encountered an increasing competition from iron castings, brass forgings, zinc die castings and the like. In meeting this competition, which centers on price rather than quality, it has become more and more necessary for the foundryman to bring his practice up-to-date with respect to cost saving methods, most of which are not new but have not been generally practised by the small foundry.

Methods of cost finding in the brass foundry have lagged behind those used in other branches of the foundry industry. At the April A. F. A. meeting in Chicago, the session held on this subject indicated clearly that, in arriving at costs, brass foundrymen do not talk a common language and are unable to arrive at a common answer from calculations based on identical data. At that time a start was made in the direction of bringing foundrymen together on this subject, following somewhat the same lines already laid out by the iron foundrymen. Accurate cost facts are essential, not only in determining a fair selling price for castings, but also in controlling the elements of cost in the manufacture of castings.

The brass foundry industry is rapidly "going scientific." The control and reclamation of molding sand, close

control of pouring temperatures by means of pyrometers, laboratory control of metal mixtures and impurities, all are becoming much more common than they were a year or two ago. By these means the foundryman is finding it possible to reduce his costs by decreasing the amount of his scrap and by utilizing cheaper raw materials. Metal wastes are gradually being eliminated although much remains to be done in this direction.

The increasing use of labor saving equipment is changing the character of the foundry organization. As the various operations become more mechanical less laborers are required and specialized knowledge and experience on the part of molders and melters becomes less essential. At the same time the work is becoming more agreeable and the wages no less. Perhaps, on the whole, mental alertness and adaptability of the foundry worker are more important than formerly. Certainly it is true that more responsibility than ever before rests on the foreman, who must understand and be capable of operating what is rapidly becoming an engineering establishment.

As a result of this condition the training of foremen is quite the most important of present foundry problems. In this the brass foundry is following the lead of the iron and steel foundries which, for several years, have made apprentice training an important part of their A. F. A. activities. At the Cleveland A. F. A. meeting in May, 1930, shop-operation courses in brass-foundry practice will be inaugurated. These should assist materially in bringing out the fact that, if the day of the experienced molder and melter is passing, the opportunity for the skilled mechanic in the foundry has arrived.

During the year just past, electric furnaces have continued to gain ground in the brass foundry. The most popular types have been the rocking electric-arc furnace and the vertical-ring induction furnace. The high-frequency induction furnace has been installed in several instances for special applications. A new normal-frequency coreless induction furnace has been described and may be expected to play a part in the industry. It is probably fairly conservative to state that the brass-foundry industry in the United States is now 50 per cent electrified.

One result of the advance made by electric furnaces has been renewed activity in the improvement of fuel-fired furnaces. Several small cupolas, of a type especially designed for melting brass and using a very pure special coke as fuel, have been installed in various plants during the past year. Very strong claims have been made for this cupola, particularly as applied to the melting of pure copper for castings. Its utility in other phases of brass-foundry work seems to be a matter of divided opinion. Probably the newest development and most radical departure from accepted practice is a rotary gas furnace, sponsored by the American Gas Association, in which the container is in the form of a metal retort, which takes the place of the crucible or refractory hearth used in more conventional furnaces.

The claims that are being made for this furnace are that it decreases fuel, maintenance and labor costs, reduces metal loss, increases the foundry output and produces a better quality of castings.

Jewelry Making

By

C. M. HOKE

Jewelers' Technical Advice Company

New York

JEWELRY making is one of the important metal industries. Millions of dollars are involved in it; its appeal is almost universal; and certainly it is one of the oldest industries in the world.

Like other crafts, it has its ups and downs; its periods of tranquillity and its seasons of revolutionary change. The last generation, taking it as a whole, has seen many changes in this ancient industry. But what sort of year was 1929?

Metallurgically, 1929 was in no sense spectacular. The price of iridio-platinum was low and free from violent fluctuations. As a result there was a falling-off in the use of palladium as an alloying element; where platinum was used, the tendency was to use iridio-platinum rather than palladio-platinum.

White gold jewelry was as common as ever, except where among high-grade goods the low price of platinum brought about an encroachment upon the white gold field. Yellow, red, and green gold are still a bit out of fashion except where a design of the so-called modernistic school calls for several colors in the one article. Many jewelers express a hope for the return of the old alloys to general use, but the time has not yet come.

The manufacture—the making up and heat treating—of the white golds is now a much more satisfactory matter than formerly. Increasing knowledge of the nature of these rather complex alloys, coupled with better furnaces and equipment, have resulted in better metal at lower prices, less spoilage, and greater satisfaction to the jeweler.

Chromium plating is well established as a finish for certain types of inexpensive goods, some of the larger manufacturers of novelties having established co-operative chromium-plating plants. The difficulties of handling this finish on a small scale are still so great as to prevent its common use in the manner that gilding and silver-plating are employed.

Artistically, 1929 has been an interesting year. The modernistic touch has appeared everywhere, sometimes to good effect, sometimes in a way to bring sharp distress to our elder jewelers. At the same time the interest in antiques has brought forth many old designs and classic influences. In fact, almost any school of design will be found in a well-stocked jewelry shop, so long as it is either very old or very new; but nothing middle-aged, such as a diamond sun-burst or a plain gold wedding ring, can be found outside a curio shop.

High grade diamond jewelry was, during 1929, characterized by the oddly cut stone, which now seems to be an established part of jewelry design.

But it was in the field of the inexpensive jewelry—the novelties—that the most bounteous outpouring of the beauties of design was seen. Never before was inexpensive jewelry so beautiful. Sold at a price within reach of every stenographer, the costume jewelry of the day was of such happy design and such sturdy construction,

that no one could resist it. Undoubtedly it has cut into the sale of the higher grade goods.

The metals used in this jewelry are rolled gold, sterling silver, brass with every possible finish, nickel silver, and Britannia. A large proportion is of European manufacture.

Fashion now demands much more attention from the jewelry wearer than before. In the old days it was enough to have a watch. Now one must have a series of watches; for sport, for business, for formal affairs, and so on. In the old days it was enough to have one pair of glasses, with an extra pair for use if the regular ones were broken. But now one must have several pairs; horn rims for travel, white gold for dress, and so on. This fashion note has been extended into all branches of jewelry; the choice of the article to wear depending upon the type and personality of the wearer, the color scheme of the costume, the occasion, the time of day, etc.

No doubt this insistence upon the right jewel at the right time has been beneficial to the jewelry business. Even so, from the financial viewpoint 1929 was not a good year. In 1928 the automobile took away many a sale from the jewelry counter. In 1929 that same influence, plus the urge to travel and the itch to buy common stocks, all made for quietness in the jewelry world, in spite of unparalleled prosperity. The fall of 1929, when the Christmas buying began, was very promising; it looked as though the holiday business might bring the total for the year to a good figure. But the stock market slump, coming when it did, was a distinct set-back, especially in the East.

On the whole, 1929 was a quiet year for the jeweler.

Progress in Electroplating

By

DR. WILLIAM BLUM

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IN recent years the old custom of making New Year's resolutions has fallen into disrepute, probably because of the disillusionment so tersely expressed in the proverb, "The road to hell is paved with good intentions." One custom often associated with the discarded one is the annual stock-taking at this season. Happily this has survived, not only in the literal business sense, but also in the fields of less tangible values. It is still appropriate to strike an annual balance, not only in the cash account but in other even more permanent assets, including the state of our knowledge. If then a consideration of this balance, whether it proves to be in red or black ink, leads naturally to certain resolutions, their making or breaking may safely be left to the individuals involved.

In any attempt to depict the progress made in an industry, a calendar year is too short a period for reliable observations. Great movements do not start up on the first of January, and accounts are not all settled on the last of December. The observer, however impartial he may attempt to be, is himself moved along the currents of thought and activity. Hence all that can be hoped from such a survey as this is to point out the trend of developments and to indicate what tendencies might be stimulated and which should be checked.

One very practical difficulty in evaluating progress in the electroplating field, is that the activities have been so great, in fact so feverish, that it is hard to distinguish progress from mere busy-ness. The predictions made a few years ago that chromium would bring plating to the foreground have been more than fulfilled. During the past two years there have been more new large installations of plating equipment than in any similar previous period. Existing plants have increased their output. Especially up to the middle of the year 1929, the demand for qualified platers and for plating chemists was much greater than the supply.

One would be unduly pessimistic to suggest that this era of plating has reached and passed its zenith. And yet the fact must be faced that there has recently been a distinct decrease in these activities, over and above what might be expected from seasonal variations or from stock market flurries. To put it tersely, plating, and especially chromium plating, is on the defensive, particularly in the automobile industry. The limitations and the failures of chromium plating, and the increasing competition from chromium alloys such as stainless steel and iron, were clearly pointed out by two authorities in this field: W. M. Phillips in an address to the Detroit Convention of the American Electroplaters' Society and W. W. McCord in an article in the November, 1929, METAL INDUSTRY. It is then high time for the plating industry to take stock and to decide whether the use of chromium plating will be a permanent accession to the plating field or a mere passing fad.

In order that increased knowledge of any subject such as electroplating may have a tangible effect on industry, three steps must be accomplished. The facts must be learned, disseminated and applied; in other words there must be research, education, and application. These three must keep pace with each other, or delay and failure are certain. Let us consider what progress has been made in each of these directions, and especially whether they are as closely interlocked as is desirable for the smooth working of an industrial machine.

Research

While there have been few outstanding papers on electrodeposition during the past year, a large number of researches have been conducted and published. Contrary to what might be expected, these have by no means been confined to chromium, though this metal has naturally claimed much attention. Important papers on nickel, cadmium and silver have also appeared. This is fortunate, for it would be a mistake to assume that chromium is the only metal whose plating deserves investigation. In fact, as has been often pointed out, the

success if not the very continuation of chromium plating depends largely upon an improvement in the quality of the coatings of copper and nickel that precede the chromium.

Even more noteworthy than the number of subjects studied, is the number of laboratories now engaged in researches on plating. These include many universities, such as Columbia, Cornell, Indiana, Michigan, Minnesota, Pennsylvania, Pittsburgh, Queens, Toronto, Vanderbilt and Wisconsin. Research institutions such as Mellon Institute and the Bureau of Standards are active in such studies. Large metal producers like the International Nickel Company and the Aluminum Company of America, are busy on plating problems. Companies such as General Motors, General Electric, and Westinghouse are giving more attention to plating problems than ever before. The manufacturers of plating supplies and equipment, like the Grasselli Company, the Roessler & Hasslacher Company, and the Hanson-Van Winkle-Munning Company, are conducting and publishing researches. With these many agencies and activities it might seem, at least to the layman, as if only a short time would be needed to practically complete our knowledge of plating processes. Such is far from true, in fact it is no exaggeration to say that most of the above institutions have formulated or could readily formulate, problems whose completion will require at least five or ten years. And by that time the list would be still larger. Every research that is "completed" at once opens up new possibilities and propounds new questions. Usually as we go deeper into any field, the problems become more interesting, but more difficult. That is one of the joys of research. It is significant that most of the recent studies of chromium plating have involved, not radical changes in operation, but rather the definition and maintenance of favorable operating conditions. Sizelove, and Pinner and Baker, showed independently how bent cathodes could be used to define and control the conditions that affect throwing power. Farber, a Research Associate of the American Electroplaters' Society, defined the conditions that yield the highest throwing power, which at best is poor. Willard and Schneidewind, and Stout and Petschaft published methods by which the sulphate content of chromium plating baths can be rapidly determined by turbidimetric measurements. Kocour has adapted apparatus for determining the sulphate content from the volume of barium sulphate after centrifuging it. Such developments are an essential step in progress. It is of little value to a plater to know how much sulphate he should have in a chromium bath, if he has no means of knowing how much he does have.

The most urgent problem in chromium plating is to define the conditions for optimum protective value. The important publications of Baker and Pinner, Baker and Rente, Wright, L. E. and L. F. Grant and others have all demonstrated and emphasized the existence of cracks in chromium deposits. While these researches have indicated that some coatings are less permeable than others, they have not yet yielded chromium deposits of high protective value. Exploratory experiments by Barrows, Research Associate of the American Electroplaters' Society, show little evidence that this serious defect of chromium plating can be directly overcome. If it can not, it will be necessary to specify even more closely the conditions for producing adherent, impervious coatings of nickel or other metals to precede the chromium.

Publications of Westbrook, Wernick, and Loven have furnished a large amount of information on the methods of operation and control of cadmium plating. At best, however, cadmium plating is still largely in the "recipe" class, and will continue so until more is known about the constitution and behavior of cyanide solutions in general.

In nickel plating the exact control of operating conditions is now important, in order to meet the stringent requirements of nickel deposits that will withstand subsequent chromium plating. The cooperative study on pH measurements, compiled by Blum and Bakkedahl, has shown how colorimetric and electrometric results can be correlated and put on the basis of the standard pH scale used in all sciences and industries. Changes in habit and thought require time, and for some years it will be necessary to define precisely the pH measurements reported, especially in research. Graham has shown how pH measurements and titrations can be correlated.

The work of Willard and Ashworth on the determination of boric acid in nickel baths will permit its more rapid determination when necessary. Fortunately this constituent does not usually require close control.

There is still much uncertainty regarding the effects of the composition, structure and metallurgical treatment upon the behavior of nickel anodes, especially those with 99 + per cent nickel, that are now used so extensively. It is to be hoped that before long the information thus far acquired by manufacturers will be published, so that any gaps may be filled by further research. Hogaboom has shown the value of a high chloride content to secure uniform corrosion of high purity anodes.

Silver plating has received special consideration in England, where several valuable papers have been published by Sanigar and Glasstone. Work such as that of these authors on cathode polarization and similar properties of the solutions is bound to be of value, even though the results can not yet in all cases be interpreted in terms of actual plating conditions.

The work of Barrows on spotting out served to confirm many of the previously reported facts and opinions, and in addition emphasized the very great practical value that suitable lacquers may have in retarding both the sulphide and the stain spots.

Education

It is safe to say that ten or fifteen years ago plating researches as numerous and valuable as the above might have been (and indeed were) published in the scientific journals, and several years might have elapsed before even a small number of platers became acquainted with the results. The fact that today the gap between research and practice in plating has been so greatly reduced, is due more to the American Electroplaters' Society than to any other agency. That its founders and early leaders should have recognized the need for more knowledge on the part of platers is commendable and natural. What is more surprising and very fortunate is that they had the foresight and courage to welcome, as associate members, chemists and metallurgists interested in this field. That such a welcome was genuine is evident from the fact that at the last convention in Detroit, over half the papers were presented by chemists. This fact may be a cause of concern or even alarm to some platers. But it should not be so construed. It is simply an evidence of the good-will of these chemists and of their convictions that their researches are doubled in value by being made available to the practical platers. The large attendance and close attention of the latter is equal evidence that the plater of today is resolved to benefit from every opportunity he has to learn and thus to fortify himself not only for the demands of today, but of tomorrow. In England the Electroplaters' and Depositors' Technical Society is affording a similar opportunity for contact and cooperation between platers and chemists. Their pub-

lications and discussions during the past year have shown the great value of such an association.

But it takes more than a lecture to enable a plater to make use of chemistry; he must get the feel of the apparatus, and learn not to be afraid of a burette or a pipette. The classes in chemistry held by so many branches of the Electroplaters' Society literally open a new world to the plater. It has been my good fortune to have conducted such a class during the past two winters. Good fortune, because it has given me an insight into platers' problems, and incidentally has added to my store of practical knowledge. Any chemist engaged in plating work should welcome or even solicit the opportunity to teach such a class in his vicinity, and thus render a service to the platers and to himself.

The need and opportunity for instruction are not confined to platers. During the past few years there has been a continual demand for talks, especially on chromium plating, before local sections of the American Chemical Society, American Electrochemical Society, American Society for Steel Treating, American Society of Mechanical Engineers, and other technical organizations. To the extent that this demand can be met, it renders service to the plating and manufacturing industries and to the platers themselves. Well informed executives and technical directors are likely to give much better support and cooperation to their plating departments than was possible when, as was too often true up to a few years ago, they scarcely knew that their plating departments existed except when some complaint was made of the finishes.

Journals such as the "Electroplaters' Monthly Review," THE METAL INDUSTRY, THE BRASS WORLD, "Metal Cleaning and Finishing," and the London "Metal Industry," have all published so many articles on plating that there is little excuse today for any progressive plater not knowing what is going on in this field.

Applications

As mentioned above, there has been a great expansion of plating plants and equipment, and especially of apparatus for automatic plating. Such processes involve "electroplating engineering," a profession that has just come into being in the past few years. The proper design of automatic equipment demands a precise knowledge in advance of such factors as the required production, the cleaning cycle, the composition and thickness of each deposit, the composition, temperature and conductivity of the solutions, the current density to be used and hence the time required for each step, and the composition and area of the anodes. When a complete cycle is decided upon and apparatus is designed to meet it, any large change in the requirements or operating conditions is almost certain to affect unfavorably the quality or quantity of the work produced. Unquestionably this condition has developed in some plants and has caused some of the failures of which we have heard recently. Plants have been designed and installed almost overnight, and at the very time when the installations were nearly completed, the chemists and engineers were still making tests to decide what processes should be used in them! In other cases plants designed for a given output were suddenly speeded up to yield double or triple the estimated production. Thinner coatings, both of nickel and chromium, were then applied than were warranted by the knowledge available.

It is difficult, in fact impossible, to fix the exact responsibility for such conditions. At least it can be safely said that they arise from two principal causes, first a lack of exact knowledge regarding the requirements of a satisfactory coating for a given purpose, and second a failure to use fully and conscientiously the knowledge that is available. The first cause can be removed, for the future at least, by more and more research by all interested agencies, not only on the problems that are already pressing, but even more on the problems that are likely to confront the industry in the next few years. The remedy for the second cause is a greater pride in good workmanship on the part of plater, chemist, superintendent and sales manager.

I do not mean by the above paragraphs to imply that chromium plating in general, or any large proportion of it, is a failure. Actually on 99 per cent of the new cars, the chromium plating is so far superior in appearance and permanence to the nickel finish previously used that the one per cent or less of failures become the more conspicuous. Similarly on plumbing fixtures, the failures and unsolved problems refer to only a very small proportion of the chromium plated goods. Chromium plating has not met all expectations, but that is largely the fault of too great expectations. Now that we know its faults, some of which may in time be reduced or overcome, it is possible to plan its applications more intelligently. In such planning, it is just as important to exclude chromium plating from those articles to which it is not adapted, as to apply it on those with which it is satisfactory.

To sum up, there is a decided "black" balance on the ledger for the year in plating, including chromium. The figures on the liability side can not be ignored, but at least there is no occasion for panic so long as the assets greatly outnumber the liabilities. The greatest assets are the least tangible, and they are the interest, enthusiasm, industry and perseverance of the platers. These insure growth and progress in the plating industry. "The best is yet to be."

Silver Plated Watch Dials

Q.—Enclosed you will find two watch dials. Can you tell me how they are finished? I have tried silver plating but cannot get the nice white color that these dials have. I have also tried cream of tartar and nitrate of silver and salt but these do not give the desired result. I would also like to know whether these dials have been sand blasted or acid dipped.

A.—The dials have been black nickeled in large sheets, then put through the photographic etching process, the resist removed from the background, then silver plated, giving the contrast in black and white.

They have not been sand blasted and probably not acid dipped. The spangled effect is probably due to the perchloride of iron etching.

The yellow tone of the silver plating may be due to the lacquer used. Try and secure a high grade silver lacquer and thin down as much as possible without iridescent colors showing.

The yellow tone may be helped also by leaving the dials hanging in the solution after the plating operation, with the current shut off. Also, it would help if not more than one volt tension were used. A very fine jeweler's scratch-brush can be used if the scratch-brushing is done before the resist is removed from the black figures.

—WALTER FRAINE.

Ornamental Sheet Metal Flower Vases

How to Form Complex Designs for Indoor and Outdoor Use

By WILLIAM MASON
Metal Spinner

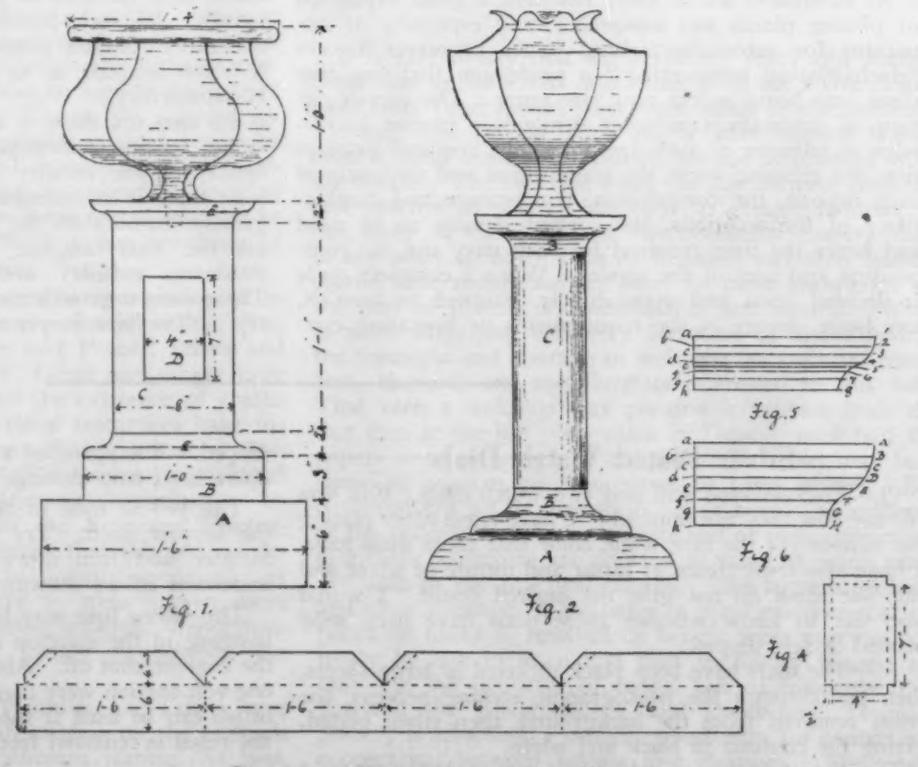
WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

THE flower vases here illustrated and described are suitable both for indoor and outdoor use. Various types are shown to meet different requirements, and, if necessary, these may be further modified to accommodate individual tastes. In all cases, however, the design should be made to harmonize with the immediate surroundings. Thus, while Fig. 1 would be suitable for outside use and ornamentation, generally speaking, Fig. 2 would be more appropriate for indoor decoration. And especially would this apply if the room in which it is intended to be placed is of limited dimensions. Having a circular pedestal, it would present no sharp edges, corners, or other undesirable features of a like nature, the absence of which would be decidedly advantageous under these conditions.

There is quite a variety of suitable metals that may be selected from (tinplate, tinned iron or steel, galvanized iron, zinc, copper, and brass), though one or two points concerning them should be carefully noted. Where economy is a consideration, tinplate, galvanized or tinned iron should be used. These metals, while not possessing the durability of copper and brass, may be kept well preserved with an occasional coat of paint; and, of course, they are much cheaper. Zinc, which is slightly dearer than tinplate, though not so expensive as copper or brass, is probably second to none in point of durability of all the metals mentioned. Yet it should be borne in mind that this metal is apt to warp in the heat of the sun, and the resultant distortion of shape which is liable to occur would seem to prohibit its use somewhat for this reason. Copper and brass are better metals to employ for this class of work, both being durable and malleable. Further they are also capable of taking a high polish, or being otherwise finished without recourse to either paints or enamels, of course, a combination of metals may be used, and in such a case it would be preferable to employ copper for the moldings, etc., this being an easy metal to manipulate.

Referring to Fig. 1, a pattern for the square base A is shown by Fig. 3. The upper notched portions are bent over a hatchet stake, until they are brought at right angles to the remainder of the pattern, after which the pattern is bent along the vertical dotted lines to form a square. Solder the lap seam, arrange the mitre joints so that the laps represented by the dotted lines lie evenly under their corresponding edges, and solder these also. B (Fig. 1), which is superimposed on A, is made similarly, though, of course, smaller. C (Fig. 1), which in turn is superimposed on B, is an 8 in. square pipe 1 ft. 5 in. long. A pattern for the panels is shown by Fig. 4. It is notched as indicated, the edges being turned up square along the dotted lines. The corners should be soldered inside, but it will be better to solder the panels in position at a later stage.

The vase stands on a flat piece of metal 12 in. square, which is notched and edged ¼ in. along each of the four sides. This should be soldered to the square pipe with the edges projecting downwards. The moldings E may now be cut, shaped, and soldered in position. To draw a pattern for the molding, let Fig. 5 represent a half elevation of the molding E (Fig. 1). Divide the mitre curve into a number of equal parts as at 1, 2, 3, 4, 5, 6, 7, and 8, and draw parallel lines as a1, b2, c3, etc. Now set off along the line a h (Fig. 6) the distances b, c, d, e, f, g, equal to the distances 1, 2, 3, 4, etc. (Fig. 5), and from these points at right angles to the line a h. Make aA, bB, cC, dD, eE, fF, gG, hH (Fig. 6) equal, respectively, to a1, b2, c3, d4, e5, f6, g7, h8 (Fig. 5) and draw a curve line A to H (Fig. 6) through the points thus obtained to complete the pattern. The other mitres may be marked off this pattern.



Diagrams of Various Parts of Sheet Metal Vases

Bronze Welding Rod and Its General Use On Metals

By P. W. BLAIR

BRONZE welding as used generally is not a new process and it is rapidly coming into prominence as one of the most widespread and progressive of welding practices, as well as one of the most adaptable for general use.

Bronze welding is used at all times for joining by fusion all types of brass, bronze and copper alloys; also for joining dissimilar metals as in fastening a cast iron fitting to a steel tank, repairing or fabricating malleable iron, cast iron or steel structures or parts; it is used also for building up bearings and other wearing surfaces.

More uses are being found for bronze as a welding material in industrial operations every day. The future of bronze welding and the use of brass and bronze alloys in fabrication processes is based upon the sound welds produced by using this alloy.

The advantage of using the bronze weld metal rather than any other method of joining or repairing parts is that bronze alloys easily with similar bronzes or brasses and also has the property of joining by adhesion with steel, iron and other metals, at temperatures below the melting points of these metals. The joins thus obtained are of high strength and ductility and also have high resistance to wear.

For fusion welding several different types of bronze, brass and copper welding rods have been used. There is now a special welding rod on the market which can now be adapted where bronze welding is the method specified. This high strength bronze welding rod will produce weld metal of superior quality for all bronze welding applications. This rod will not only produce sound welds but the resulting weld metal will be considerably stronger than metal produced from ordinary bronze welding rods. By the use of this rod, the metal melts rapidly and evenly and solidifies when the heat is taken away. The rod melts as a uniform alloy and when molten has a creamy, clear appearance. Zinc fumes are eliminated. Solidification of the puddle is rapid and the resultant weld is free from gas pockets and porosity throughout.

The evolution of zinc oxide fumes in heavy bronze welding with some bronze welding rods is so great that precautions in the nature of masks and ventilating equipment are sometimes necessary to prevent the operator suffering discomfort. The timing action of this rod is the same as that of the former welding rods except that due to the cleansing action caused by its composition less flux will be required to cleanse the base metal.

Not only are the welding properties of high strength bronze rods much better, but the strengths of both the weld and the bond between the weld metal and the base metals have been materially increased.

Verde and English Bronze Finishes

Q.—Can you give me a good reliable formula for verde finish on copper plating? Also, for English Bronze on brass? My present formula for verde is as follows:

Ammonium chloride	2 oz.
Copper nitrate	3 oz.
Calcium chloride	2 oz.
Water	4 gal.

For English Bronze on brass I use:

Antimony sulphide	2 oz.
Ammonia	1 gal.
Water	4 gal.

I have not gotten a satisfactory result from these.

A.—If you desire a verde green that will not attack the copper plating and which may be used on top of light copper coatings, it is advisable to use the pigment finishes, which can be either brushed, stipled or sprayed on. This should be done over clear lacquer; where a spray gun can be used the cost in labor is low. The high lights can be relieved with turpentine.

A chemical verde finish is a matter that depends on the product, desirable for some and not for others. A good verde green for general use is as follows:

Copper acetate	12 oz.
Ammonium chloride	20 oz.
Acetic acid (commercial)	1 pt.
Copper carbonate	5 oz.
Muriatic acid	1 pt.
Water	Enough to make a thin paste.

If color is too green, add sufficient carbonate of zinc to bring to shade. The verde should be stippled on and allowed to dry over night. When dry, brush down with a plater's tampico brush to an even shade and lacquer.

For a good English bronze try the following:

Take one gallon muriatic acid, add white arsenic until saturated, then add one gallon water. Use cold, with or without current. Carbon anodes. —WALTER FRAINE.

Chromium on Brass

Q.—At the present time we are using as trimmings on our automobile trunks, brass bindings and brass corners which we are having chromium plated.

We have been referred to you for advice as to the best method of chromium plating brass. We find that some platers are nickel plating and then chromium plating, and others are just chromium plating the brass.

Of course, the hardware on our trunks is subject to all kinds of weather and we must be assured that the chromium plating is going to withstand these weather conditions.

We would very much appreciate your advice regarding the best manner of chromium plating brass so that we may receive the best results.

A.—The brass that is used in the manufacture of such work as yours is usually termed a "high brass," that is, the alloy contains 80% or less of copper, the balance being zinc.

It has been found from experience that when a high brass alloy is plated with chromium direct, the deposited chromium has a tendency to flake or peel from the base metal. It is, therefore, best to nickel plate and nickel color this class of work before chromium plating, to produce a satisfactory job. —OLIVER J. SIZELOVE.

Gold Recovery

On page 523 of our November issue under the heading "Gold Recovery from Solution," it was advised to crush a residue consisting of ammoniuret or fulminate of gold in a mortar. This was an inadvertent error, as such a procedure might be dangerous.

In the recovery of gold from solutions, it is best to send material to the refiner who is equipped for this type of work. In any case, the final refining or smelting should be done without attempting to crush the material.

Stripping Chromium Plate

Electrolytic Stripping in an Alkaline Solution Is Recommended

By R. W. MITCHELL, Ph. D.
Magnus Chemical Company, Inc., Garwood, N. J.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

ELECTROLYTIC stripping in an alkaline solution is the most practical way of accomplishing the removal of an imperfect chromium plate. In plating practice this is, of course, often necessary where "dulls," "blues," or an uneven or "off color" deposit has been secured. The reasons for these may be temperature variation, current density too high or too low, altered composition of the electrolyte or poorly prepared under-surface. Improper racking, which affects current density, is probably the most frequent cause.

When the chrome plate is buffed, the plate if too light may be cut through. This is another source for parts to be stripped.

Chrome plate has commonly been stripped with a hydrochloric acid pickle. This method is fast but it is costly and inefficient. With an acid pickle it is difficult, if not impossible, to ascertain when the chromium is completely removed. This means that over pickling is common. Where nickel is the base deposit this also is attacked. If the chromium is plated directly upon base metal, the latter is pitted or attacked to some extent. So even though only the chromium plate were at fault all the previous deposits and buffing operations are of no avail.

It is well known to electro chemists that a chromium anode will go into solution in an alkaline electrolyte, forming a soluble chromate. Nickel, copper, or iron under these conditions are not attacked.

$$Cr + 6OH + 6F = CrO_4 + 2H + 2H_2O.$$

This equation indicates that one atomic weight (52 grams) will dissolve from an anode in an alkaline electrolyte with the passage of six faradays (1 faraday = 26.8 ampere hours) of electricity (assuming 100 per cent current efficiency). The dissolved chromium appears in the solution as soluble chromate, the result of the anodic oxidation process. The equation also indicates that the solution rapidly loses alkaline strength as electrolysis proceeds.

If the equation is written in a different form it may be more intelligible to some. The above form is ionic, expressing the reaction at the anode. The older way of expressing this would be:—

$$Cr + 2\,NaOH + 2H_2O + 6F = Na_2CrO_4 + 3H_2.$$

This tells us the same thing in another way—chromate is formed at the anode and hydrogen is evolved at the cathode.

Practically every plating shop uses an electric cleaning tank. This may be used for electric stripping of chromium. In the test described below Magnus Platers' Cleaner was used as the electrolyte; any other similar material will undoubtedly work in the same way. Caustic soda solution is suitable but is less convenient to handle and is difficult to rinse completely from the work. No material containing rosin, fatty acids, silicate or chloride should be used for this work. The first three may scum the anode; the latter will form hypochlorite in solution which will tarnish copper, brass or nickel.

The solution used was at a concentration of 6 oz. per gal. The temperature was maintained at 180-200° F. The connections should be just the reverse of those used for electric cleaning, where the work is generally made the cathode. (Use of a double pole two throw switch allows ready reversal of current direction.) With the work as anode and approximately six volts potential, thin or light deposits can be stripped in two minutes; heavy deposits longer in proportion to their thickness.

If it is desirable that an underlying nickel plate be subsequently removed this should be removed in a sulphuric acid electrolyte using the electric current in the usual manner.

If only the chromium is at fault and an underlying nickel or copper plate is satisfactory, after the electric stripping of the chromium they may be buffed again for redeposition of chromium.

An important point intimately connected with this procedure, which is now under investigation, should be noted. If work, which is to be subsequently plated, is cleaned in an electric cleaner containing chromate, the subsequent plating operation may not be successful. A very thin film thought to be chromic chromate forms upon the cathode. This does not rinse off and on going into the plating baths acts as a "resist," slowing up and in many cases actually preventing plating.

This means that a solution used for chromium stripping should not be subsequently used for electric cleaning before brass, copper or nickel plating.

Colors on Aluminum

Q.—There are enclosed two samples of aluminum colored in red and yellow, and these colors appear to have been put on chemically rather than with lacquer or enamel.

If you can determine and advise us through your columns how we can duplicate this finish, your advice would be very greatly appreciated.

A.—The two samples submitted have been tested in various ways to determine the coating. None of the solvents for the cotton base lacquers or for the gum or pigment varnishes have any effect on them. The only solvent found that will remove the coating is a warm caustic solution. They are not enamels.

The samples are, in our opinion, coated with a synthetic resin lacquer in a phenol combination vehicle, to which colorings have been added to secure the different shades. It has many of the characteristics of bakelite compounds.

This lacquer is a patented product, brought out by one of the large electrical manufacturers and its sale is controlled by one of the largest lacquer producers in this country. They sell both the finished product or the materials to any one desiring to make their own lacquer.

—WALTER FRAINE

The Tariff on Graphite

Why an Increase in the Tariff on Graphite Will Injure American Crucible Manufacturers and Metal Melters Without Helping the American Graphite Producers

By JONATHAN BARTLEY
Crucible and Graphite Expert

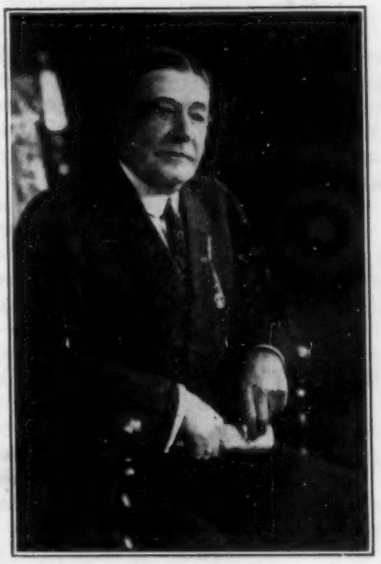
WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

IT might be well at the beginning of this article to state that the writer is in no way connected (either directly or indirectly) with any concern that is using graphite, nor does he have any interest in, or connection with, any concern that sells or handles graphite. Consequently, a tariff cannot affect him personally one way or the other. But his long association with the industry brings a cherished desire to see the institutions he helped build up prosper and grow, and prompts him to lift his voice in protest against the very unjust increase of duty that cannot bring any other result than to jeopardize the prosperity of those institutions, if not to put some of them out of business entirely.

From a purely **protective** standpoint the taking of graphite from the free list in 1922 was about the most ridiculous thing a Congress could do, because it is proved that it has not protected the American producer of graphite an iota, while on the other hand it levied a burdensome tax upon industries which were already in distress through the high costs of raw material and labor, the aftermaths of war. Seven years have passed since that duty became effective and the American producer stands precisely where he stood seven years ago. The duty has not added one ounce to his sales, and the price is the same or lower than it was then. **The same condition would exist if the duty had been one dollar per pound.**

American graphite, like the amorphous variety and various grades of crystalline has merit in certain particular lines, but it cannot be used in the making of a serviceable crucible; neither will it function well in many grades of foundry facing. It never has been a competitor of Ceylon or Madagascar and never will be for the purposes mentioned. Nature alone is responsible for this, and the claim made by some overzealous expounder for a higher tariff that there is an antipathy against the American product, is absurd. The same thing might be said of the Canadian graphite because it matches up more closely with the American product than either Ceylon or Madagascar, but the Canadian miner knows that his goods have no standing or merit in certain lines and he makes no claim in that direction. He confines his efforts where his graphite has its own particular fitting. Common sense alone should teach the American producer that it would be the limit of absurdity for any business concern to buy a raw material 10,000 miles away from home, pay a higher price for it and be compelled to tie up thousands of dollars in a dead asset for stock if they could buy a home product that would answer the same purpose.

The limitations of graphite for crucibles are very narrow. The most important factors are **structure, size** and **density.** Ceylon produces over 20 different varieties and several grades to each variety, but there is only **one** variety that is suitable for crucibles. Ceylon has graphite that is more pure, or in other words is higher in carbon than what is bought for crucibles, but it cannot be used in crucibles with any satisfactory results. The same applies to the Madagascar.



Mr. Bartley has Been Known to Foundrymen for Many Years. He Was Superintendent of the Joseph Dixon Crucible Company, Jersey City, N. J., for a Long Time. He Founded the Jonathan Bartley Crucible Company; He Was President of the Bay State Crucible Company and He Built the Plant for the Chicago Crucible Company.—Ed.

Hundreds of tons have been bought for crucibles and used up in something else because it was below the standard required.

It is claimed that certain experiments were made at the Bureau of Mines when Alabama graphite was used exclusively in crucibles and that the results were very satisfactory. The only possible construction that can be put on this is that such experiment must have been made during the war period when crucible makers were forced to use very inferior graphite and their crucibles were giving a very low average in heats. Today the average is somewhere around 70 heats and it is a safe bet that if the Bureau of Mines can deliver a man capable of meeting the requirements today with a crucible made with American graphite alone, that man has a permanent job awaiting him with a salary far beyond what Uncle Sam might be paying him. The latch string hangs out from every crucible maker's door for a miracle man of this kind.

It was the high price of crucibles during the war that stimulated efforts to bring out something to take their place. Before the war crucibles were selling at 4¢ per number with a reasonable profit. War prices on graphite sent the price up to 20¢ per number. It was then that inventive genius brought out the elec-

tric furnace, and the results that have followed show that a very large volume of the crucible business has drifted to the new method of melting. The price of crucibles today is 10¢ per number, and at this price the margin of profit is less than when the price was 4¢. Within the seven years of taxed graphite no less than three of the oldest crucibles concerns have gone out of business.

With this astounding evidence before them the American miner is asking for a higher duty and this leads to a suspicion that an ulterior purpose is behind their demands. Unquestionably there are some good men who have invested their money in American graphite mines, and no doubt they have been led to believe that the claims which have been made on their behalf are just claims, but the past history of this industry shows that it has been more in the hands of promoters who have basked in the credulity of innocent investors in stock. Hundreds of thousands of dollars have been filched from the pockets of the unsophisticated by parasites of this kind. It looks as if they had worked their game to the limit and their only hope now for the hooking of more suckers was with a higher tariff bait. If Congress passes a bill increasing the duty Congress will be playing right into their hands to the serious detriment of old established concerns who have been in business a hundred years or more. The Government has denounced the past fraudulent operations, and in one of the Geological Survey reports Professor Bastin writes **"in the number of times these properties have changed hands in the course of a few years there is a record of misrepresentation and disappointment that can hardly be equaled in any branch of mining, and many properties have been notoriously associated with stock manipulation of doubtful character."**

Copper Plating Wire on Production Basis

Q.—We are up to a problem we do not like to tackle unless we can get your ideas about the matter. At our plant in Holland, some 5 to 10 tons per week of steel wire, high tension, has to be coppered with a minimum of 4 grams of copper per 1 K.G. The wire is approximately 1 mm. in diameter.

We cannot see any other way than electrolytically coppering it. If we cannot do it ourselves, we shall have to drop the idea. We enclose a few pieces of the wire to show how the finish is before coppering. It is so-called wet drawn wire; drawn in sulphate of copper. We do not make wire. We came to the following figures:

1 K.G. is 160 meters long; 10 tons is 1,600,000 meters and has a surface of 502,000 square decimeters. If we give it 4.47 grams per K.G., the thickness of the coat would be exactly .001 mm. To get this, we would need 892 amperes, leaving out any current for possible electrocleaning.

With 10 meters of wire under current in the solution, it would need 2.4 minutes to pull it through if there is current density of 2 amperes per square decimeter. With those items, i.e., length of bath 10 meters, time 2.4 minutes, and current density 2 amps/sq. d m., it would take 142 wires to pass through together in one or more vats to do 10 tons in 45 hours, working efficiency 100%.

That is out of the question. We have room for only 20 coils at both ends of the plant. Suppose we climb down to 5 tons a week and work two shifts; there are still 36 wires, and then, of course, since we cannot work with 100% efficiency, we would not make more than 4 tons.

The length of our room is about 45 feet and if necessary, width can be figured the same.

We have thought of just one electro-cleaner with a 12 or 15 volt dynamo; then cold running water; water again; plating solution; cold running water; hot water; and if that is not sufficient for drying, hot air and then to the block.

Can you tell us of any other method of coppering this wore? If not, what syanide solution would be the best, working it hot at any temperature if you like? What is the highest current density possible?

A.—You are correct in your opinion that it will be necessary to electroplate the copper on the wire to obtain the desired weight. The cyanide copper solution is the only one that can be used. It can be made as follows:

Copper cyanide	4.3 ozs.
Sodium cyanide	6.0 ozs.
Soda ash	4.0 ozs.
Water	1.0 gallon

The temperature should be not over 120 deg. F., as above that point the cyanide decomposes rapidly. A current density of 20 amperes per square foot can be used at a pressure of about 3 volts.

It has been stated that solutions of a higher metal concentration can be used and with higher current density. Such solutions are short lived; and as they build up rapidly in carbonate content, the electrode efficiencies decrease materially. The character and adhesion of the deposited copper is also affected, and in your work the deposit must be ductile and adherent.

It is evident that the sample wires sent by you were drawn through a polished steel die after copper plating. It would be difficult to obtain the same lustre in the plating bath, and to obtain it by mechanical means after plating would be expensive. The best plan to follow would be to copper plate the wire more heavily, directly after the final annealing, and then drawing to size. The weight of copper deposited will depend upon the number of reductions given. As copper acts as a lubricant in drawing, and as it prevents the surface-hardening of the steel wire, it may be found necessary to increase the number of reductions after the final annealing. That would make it advisable to anneal the wire before it has reached the dimension at which it is now annealed. It is quite possible that the annealing operation previous to the final one is the acceptable final anneal and, therefore, eliminate one annealing.

If a small amount of neutral soap chips is put into the final hot water in the cycle of operations that you give, it will be easier to dry the wire free from stains.

—Electrochemical Engineer.

Pouring Bronze Gear Blanks

Q.—I have conflicting reports about the temperature at which gear blanks weighing about 150 lbs., 89 copper, 11 tin, should be poured. Will you please publish the answer to this?

A.—We suggest pouring at 1100° centigrade. We would also suggest that you use 1% of nickel to keep the tin from segregating. This gives good results in gear blanks.

—W. J. Reardon.

Hanson-Van Winkle-Munning Company Change

THE metal finishing industry has for several weeks been permeated with rumors regarding certain changes pending in the Hanson-Van Winkle-Munning Company of Matawan, N. J. In order to get authoritative information, representatives of THE METAL INDUSTRY visited the officers of the above company in Matawan.

We were informed that there is a change in prospect in the Hanson-Van Winkle-Munning Company. This change involves only the sale of the common stock held by A. P. Munning, the present chairman of the board, and some of his associates, to Van Winkle Todd, the present president of the company, and other associates and employees in the business. Mr. Munning and his associates will retain a substantial interest (over $500,000) in the preferred stock of the company, and Mr. Munning will probably remain on the board of directors.

This transaction has not yet been consummated, but has been definitely provided for in a contract of several months' standing, which will become effective shortly. At such time, THE METAL INDUSTRY will publish a complete announcement and report covering the situation in full detail. In the meantime, we are assured that no changes in the personnel, management, policies or methods of the Hanson-Van Winkle-Munning Company are contemplated.

It was stated to us that the sole reason for the change was Mr. Munning's desire to retire from active business at this time of his life. He has brought the company to a position where it is practically impregnable from a business point of view and he now wishes to turn it over to those who helped him in creating it and bringing it to this point.

In the two years since the amalgamation of The Hanson & Van Winkle Company and A. P. Munning & Company, the business of the combination has practically doubled in volume. The factory space has been more than doubled through the purchase of additional property, and the profits of the company have increased greatly in these two years, even through all of the period of consolidating and re-organizing plants, personnel and departments, standardizing two different types of equipment into one, and in addition making many major improvements and putting out many new items of new equipment and supplies. The management advises us that this has been possible only as the result of the complete cooperation of all executives and employees and the friendly spirit prevailing throughout the entire organization.

We are informed that the company has attained a position not even hoped for at this time. It is ready to begin 1930 with its period of amalgamation and re-organization behind it. Plans have been completed for a more aggressive sales campaign in the immediate future which should result in increased business in 1930 and the following years. New processes have been developed in the laboratories which will decrease the cost of electroplating and facilitate its spread into new fields, thus increasing the market for the company's equipment and supplies.

Comparative Metal Production and Consumption Statistics

The United States is probably the leading producer of metals in the world. In some cases we produce more of a specific metal than all the rest of the world combined. However, there are several outstanding exceptions to this rule. We produce almost no nickel, tin, mercury, antimony or platinum. At the same time we are enormous consumers of these metals. A general statistical summary for 1928 is given below, in round numbers, in order to compare American and world production of various metals, and also American consumption. Some figures are omitted, due to lack of accurate statistics.

Some of the seeming anomalies are readily explainable. The United States consumed more platinum than the world produced, but the total of 150,000 ounces which were consumed included recoveries from secondary metals, about one-third of that total. The consumption of 35,000,000 Troy ounces of silver also included a large volume of secondary metal, as did the figure of 2,860,000 ounces of gold. Nickel, tin and platinum are almost nonexistent among our natural resources so our consumption of these metals is made up entirely of imports and recoveries from scrap.

	AMERICAN PRODUCTION	WORLD PRODUCTION	AMERICAN CONSUMPTION
Copper	1,000,000 tons (53% of total)	1,900,000 tons	980,000 tons
Zinc	590,000 tons (38%)	1,570,000 tons	580,000 tons
Tin	....	175,000 long tons	80,000 long tons
Lead	625,000 tons (35%)	1,800,000 tons	930,000 tons
Aluminum	80,000 tons (36%)	225,000 tons	....
Nickel	500 tons (1%)	65,000 tons	50,000 tons
Platinum	275 ounces Troy	143,000 ounces Troy	150,000 ounces Troy
Silver	56,000,000 ounces Troy (23%)	248,500,000 ounces Troy	35,550,000 ounces Troy
Gold	2,180,000 ounces Troy (11%)	19,435,000 ounces Troy	2,860,000 ounces Troy

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Finishing Gold

Q.—I want information regarding the coloring and finishing of gold, platinum, etc., and would be obliged if I can obtain this information through you. I have your old handbook on plating and finishing.

A.—The inquiry is too indefinite to determine just what information is desired. If it means the various finishes given gold articles: i.e., roman, rose, green gold, etc., the handbook gives excellent formulas and methods.

If the information relates to actual manufacturing and finishing operations on precious metals, please write us again, more specifically.

—WALTER FRAINE.

A Metal Industry Financial Review

A Statistical Summary of Some of the Leading American Non-Ferrous Metal Manufacturers

By GEORGE W. GRUPP

Professor of Economics at Webb Institute of Naval Architecture, New York

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

THE fiscal year ending December 31, 1928, as reported at various times during 1929 by the companies reviewed in the accompanying statistical table, was a reasonably successful year. All were in a remarkably strong current position.

Now one might justly ask, what will the fiscal year ending December 31, 1929 reveal? The indications seem to point to a better showing for 1929 than 1928. This will be due to the better prices obtained and the public's confidence in America's prosperity. The stock market crash has thinned some of this confidence, but not to any serious degree.

The market prices of shares reached the low level for the year during the stock market panic, but all have recovered some of their shrinkage. Shrinkage in market prices should not be confused with the equity in and behind the prices. After making proper allowance for normal changes in current positions it will be found that the equity is the same as before the crash. In other words paper values have shrunk, but real values have not.

Mergers and expansions were the fashion in 1929. Space, however, will permit only a brief mention of the outstanding events.

For plant expansion purposes the Aluminum Goods Manufacturing Company spent $700,000; the Doehler Die Casting Company spent $100,000; the International Nickel Company spent $1,500,000; the American Metal Company, Limited, and the International Nickel Company spent jointly $5,000,000; the Reynolds Metals Company spent $1,225,000; the American Smelting & Refining Company spent $4,000,000; the Aluminum Company of America, the Anaconda Copper Mining Company and the Kennecott Copper Corporation each spent millions of dollars.

The General Cable Corporation set up a $1,150,000 copper price fund out of its earnings for the first half of 1929 for protection against a drop in prices.

The General Bronze Corporation acquired the Wisconsin Ornamental Iron and Bronze Company, the Guaranty Iron & Steel Company, the Roman Bronze Works and the American Art Foundry, Incorporated.

The Aluminum Company of America acquired the Modern Foundry & Pattern Works; the Aluminum Industries Incorporated acquired the Diamond Motor Parts Company; the American Metal Company Limited acquired substantial stock interests in African properties; the Club Aluminum Utensil Company acquired a 50% interest in the Monarch Aluminum Ware Company; the Segal Lock & Hardware Company Incorporated acquired the Universal Safety Razor & Blade Corporation and the Norwalk Lock Company; and the International Nickel Company acquired the Mond Nickel Company, Limited, largest British producer.

The National Lead Company sold its half interest in the Williams, Harvey & Company Limited to the Patino Mines & Enterprises Consolidated Incorporated. With the proceeds from this sale it bought a substantial minority interest in the Associated Lead Manufacturers Limited.

Early in 1929 the Art Metal Works Incorporated organized a British subsidiary known as the Art Metal Company Limited. Fifty per cent of the capital stock is owned by the Art Metal Works and 50% by the Cadogan Company of England. In addition to sharing 50% of the net profits the Art Metal Works Incorporated receives a 5% royalty on the gross sales for the use of its patents.

Chase Companies Incorporated which owned 100% of the stock of the Chase Brass & Copper Company, 100% of the American Brass & Copper Company, 100% of the Consolidated Safety Pin Company, about 63% of the Superior Wire Cloth Company, and 50% of the Hallenbeck-Hungerford Realty Company, was merged with Kennecott Copper Corporation on a basis of 2¼ shares of Kennecott for one share of Chase.

On February 20, 1929, the Anaconda Wire and Cable Company was organized by the Anaconda Copper Mining Company with capital stock of 1,000,000 shares of no par common for the purpose of merging a number of fabricating companies. The Anaconda Wire & Cable issued 120,678 shares in exchange for the business and assets of the Great Falls Rod & Wire Mill of the Anaconda Copper Mining Company and for the Kenosha Wire Mill of the American Brass Company; 102,800 shares were issued in exchange for the assets of the Inland Wire & Cable Company plus $478,020 in cash; 23,400 shares were issued in exchange for the assets of the Tubular Woven Fabric Company; 47,500 shares were issued in exchange for the assets of the Maring Wire Company; 100,000 shares were issued in exchange for the assets of the Hastings Wire & Cable Company; and 7,445 shares were issued in exchange for the assets of the Marion Insulated Wire & Rubber Company plus a cash payment of $425,000.

Some time in November 1929 the Republic Brass Corporation changed its corporate name to that of the Revere Copper & Brass Incorporated.

This condensed review, by no means complete, makes no attempt other than to mention the outstanding events during 1929.

On the opposite page (27) will be found a table giving a variety of figures concerning a number of leading companies in the metal producing and manufacturing lines.

Cold Black Dip for Steel

Q.—I am enclosing a flat corset stay and would appreciate it very much if you give us a cold dip for the end of these stays. It is not convenient to use a hot dip.

A.—Several different fast air-drying black lacquers were tried on the corset stay submitted, with very satisfactory results. As we do not recommend particular products in this inquiry section, get in touch with lacquer manufacturers in our advertising columns who can furnish you with fast, air-drying hard blacks which will give you the results desired.

—WALTER FRAINE.

Summary of Financial Statistics of Metal Companies

Their Capitalization, Stocks and Bonds, Assets, Earnings, Share Values, etc., in a Comprehensive Table of Figures

Name of Company	Outstanding Common	Outstanding Preferred	Total Funded Debt	Total Capitalization	Surplus	Total Assets	Current Assets	Current Liabilities	Net Working Capital	Earnings Per Share of Common	Earnings Per Share of Preferred	1929* Prices on Common Per Share Highest	Lowest
Aluminum Company of America	$ 7,363,125	$147,262,500	$40,000,000	$194,625,625	$10,659,524	$217,531,054	$71,030,421	$6,889,553	$64,140,868	$7.08	$13.09	539½	146
Aluminum Goods Mfg. Co.	14,192,354	.....	.....	14,192,354	1,785,087	18,740,546	12,214,293	2,763,105	9,451,188	1.42	.....	41	20
Aluminum Industries, Inc.	1,580,006	.....	.....	1,580,006	149,734	1,860,530	896,715	89,426	807,289	1.93	.....	48	22⅛
American Metal Co., Ltd.	18,499,700	10,000,000	292,000	28,791,700	10,719,607	52,824,161	28,883,585	9,896,575	18,987,010	3.58	26.52	81⅛	31½
American Smelting & Refining Co.	60,998,000	50,000,000	37,782,100	148,780,100	35,282,584	233,020,965	92,994,348	23,631,265	69,363,083	8.24	37.17	130¼	62
Anaconda Copper Mining Co.	185,415,550	.....	136,727,000[13]	322,142,550	99.703,599	505,683,143	117,738,409	51,740,903	65,997,506	6.63	.....	140	70
Anaconda Wire & Cable Co.[3]	19,050,305	.....	.....	19,050,305	.....	22,699,123	.....	.....	.....	...	.....	89¾	49½
Art Metal Works Inc.	1,693,887[7]	.....	.....	1,693,887	838,633	2,791,685	1,713,444	259,155	1,454,289	8.71	.....	57¾	15
Bohn Aluminum & Brass Corp.	7,345,987[6]	.....	.....	7,345,987	.....	11,303,886	6,406,607	1,802,199	4,604,408	9.09	.....	136¾	37
Chase Company, Inc.	11,250,000	2,500,000	2,712,000	16,462,000	10,142,960	29,757,408	17,346,243	3,152,442	14,193,801	...	.....	105	99⅞[20]
Club Aluminum Utensil Co.[2]	1,903,000	.....	.....	1,903,000	.....	2,275,926	1,571,554	312,499	1,259,055	0.01	.....	33½	3⅛
Doehler Die Casting Co.	507,973	2,000,000[11]	137,500	2,645,473	2,854,822	6,132,191	2,406,180	601,513	1,804,667	3.19	20.28[17]	42	14⅛
Federated Metals Corp.[2]	9,161,495	.....	4,000,000	13,161,495	1,262,458	16,295,752	10,411,650	1,841,802	8,569,848	3.30	.....	39	20
Ferro-Enameling Co.[4]	609,279[8]	.....	.....	609,279	.....	798,802	539,308	145,886	393,422	...	.....	73⅛	50[22]
General Bronze Corp.	1,099,925	.....	65,000	1,164,925	3,087,508[14]	4,984,258	3,378,602	710,521	2,668,081	3.61	.....	69¾	24
General Cable Corp.	17,110,782[9]	15,000,000	.....	32,110,782	3,720,731[15]	59,622,892	31,650,901	7,441,380	24,209,521	9.79[18]	25.92	61	23
Inter'l. Nickel Co. of Canada, Ltd.	46,909,200	8,912,500	1,800,000	57,621,700	33,169,819	95,999,408	34,080,070	3,616,596	30,463,474	0.36	45.94	72¾	25
International Silver Co.	9,119,731	6,028,588	.....	15,148,319	6,045,181	22,386,058	13,322,910	1,011,258	12,311,652	13.54	27.48	159½	95
Kennecott Copper Corp.	25,000,000	.....	.....	25,000,000	250,728,175[16]	298,761,675	72,600,720	9,568,139	63,032,581	10.03	.....	104⅞	49⅛
National Lead Co.	30,983,100	34,695,300[12]	.....	65,678,400	15,243,237	100,994,559	49,043,708	10,186,674	38,857,034	11.45	64.45[19]	210	129¼
New Jersey Zinc Co.	48,081,600	.....	.....	48,081,600	.....	.....	.....	.....	.....	15.16	.....	87⅞	60½
Ohio Brass Co.	8,851,327[5]	2,000,000	.....	10,851,327	.....	11,847,435	7,272,440	996,108	6,276,332	5.41	100.01	92	69[21]
Revere Copper & Brass Co.	9,771,396[10]	10,000,000	10,000,000	29,771,396	4,737,883	43,431,769	20,581,602	3,663,488	16,918,114	...	.....	31½	28¼
Reynolds Metals Co.	7,760,924[5-6]	.....	.....	7,760,924	.....	10,567,285	3,649,743	913,846	2,735,897	...	.....	43	18⅛
Scovill Mfg. Co.	22,125,000	.....	.....	22,125,000	9,299,636	34,505,338	21,328,006	1,605,368	19,722,638	3.05	.....	66	44
Segal Lock & Hardware Co.	288,418	544,300	.....	832,718	.....	1,201,997	517,106	305,167	211,939	1.74	8.89	14	6

NOTE: These figures are from sources regarded as reliable

[1]Pro Forma January 1, 1929.
[2]Year ending June 30, 1929.
[3]Year ending November 30, 1928.
[4]Year ending October 31, 1928.
[5]Capital and surplus.
[6]Represents 322,698 shares of preferred, no par value; and 197,691 shares of common, no par value.
[7]Represents 40,000 shares of preferred and 110,000 shares of common, both no par value.
[8]Represents 25,000 shares of Class "A" and 25,000 shares of Class "B." Both no par value.
[9]Represents 411,600 shares of Class "A" and 457,500 shares of common. Both no par value.
[10]Represents 250,000 shares of Class "A" and 507,841 shares of common. Both no par value.
[11]Represents $1,000,000 in 7% cum. preferred and $1,000,000 in $7 preferred.
[12]Represents $24,367,600 Class "A" preferred and $10,327,700 Class "B" preferred.
[13]$16,933,000 of these bonds were due 1929.
[14]Represents $2,290,664 in paid-in and capital surplus and $796,844 in earned surplus.
[15]Represents $1,443,840 in paid-in and capital surplus and $2,276,891 in earned surplus.
[16]Represents $128,339,432 in paid-in and capital surplus and $122,388,743 in earned surplus.
[17]Combined preferred.
[18]Represents $6.89 on Class "A" and $2.90 on common.
[19]Represents $24.10 on Class "A," and $40.35 on Class "B."
[20]Chase Brass & Copper Co.'s preferred.
[21]Common Class "B."
[22]Common Class "A."
*From January 1, 1929, to December 20, 1929, inclusive.

Progress in Standardizing Ingot Metals

CONSIDERABLE progress in collecting data needed in the formulation of a code of specifications on copper alloys in ingot form acceptable to buyers, sellers and the trade publications in the matter of quoting prices, was reported at the meeting of the joint committee on promotion of general use of specifications for copper alloys in ingot form, held at the Cleveland Athletic Club, Cleveland, Ohio, November 10, 1929.

This committee is a special one of the American Society for Testing Materials and its findings ultimately will be reported to the regular specifications committee of the Society for final action. Co-operating in the work is the Nonferrous Ingot Metal Institute, through whose aid much of the data already compiled were obtained.

Some idea of the scope of the study being made by this special committee, and the tremendous importance of the work to nonferrous metal producers and consumers is hinted in the fact that investigations already compilated by the committee show that at present there are 599 separate specifications on copper alloy ingots now in use, which can be reduced to between 30 and 40 if a standard code can be formulated which will be accepted by industry as a whole.

Fully forty alloys now being produced are known as 85-5-5-5 mixture, it was reported at the meeting, although the range of content makes such a blanket designation a decided misnomer. These 40 alloys are produced in the following range:

	MINIMUM	MAXIMUM
Copper	83 per cent	86 per cent
Lead	4 "	6 "
Tin	4 "	6 "
Zinc	4 "	6 "
Antimony	.. "	.25 "
Iron	.. "	.35 "
Nickel	.. "	.75 "
Aluminum	.. "	.. "
Sulphur	.. "	.06 "
Phosphorus	.. "	.06 "
Total impurities	.. "	.77 "

This is only one instance of the wide range of specifications followed in the production of copper ingot alloys, and it was the opinion of the committee members that on red brass ingot alone the 178 specifications now in vogue readily can be reduced to 2.

Resolutions were adopted at the meeting directed toward furthering the work already undertaken. The further co-operation of the Nonferrous Ingot Metal Institute is to be sought in the gathering of additional facts on the uses of the various alloys. Mr. Hollowell, secretary of the Institute, said he would do all in his power to obtain this information. In this connection, it is hoped that the ingot producers will interest their customers in the desirability of furnishing information to the fullest extent so that the specifications as finally adopted will prove satisfactory to all concerned.

The meeting yesterday was well attended. Only a few members of the committee were unable to be present. Those attending were: Representing the producers—G. H. Clamer of the Ajax Metal Company, Philadelphia, who presided as chairman; William Romanoff of H. Kramer & Company, Chicago, and R. D. Hollowell of the Nonferrous Ingot Metal Institute, Chicago. Representing the consumers—F. L. Wolf of the Ohio Brass Company, Mansfield, Ohio, J. W. Bolton of the Lunkenheimer Company, Cincinnati, W. B. Price of the Scovill Manufacturing Company, Waterbury, Conn., L. B. Case of the General Motors Corporation, Detroit, and the Society of Automotive Engineers, and N. K. B. Patch of the Lumen Bearing Company, Buffalo. Representing the trade and business papers—D. M. Avey of The Foundry, Cleveland, W. S. Doxsey and William M. Rooney, Daily Metal Trade, Cleveland. C. L. Warwick, secretary-treasurer of the American Society for Testing Materials, is secretary of the committee.

Members of the committee unable to attend were: I. A. Simon of the Federated Metals Corporation, Pittsburgh, S. P. Trench of the American Metal Market, New York, J. Zimmerman of the Daily Metal Reporter, New York, and Adolph Bregman of the METAL INDUSTRY, New York.

Prizes for Articles on Metal Manufacturing and Coating

Two $50 Awards for Best Original Papers Printed in THE METAL INDUSTRY in 1930

AUTHORS of original articles published in THE METAL INDUSTRY during the year 1930—from January to December inclusive—will be eligible for two prizes of fifty dollars each, to be awarded for the best articles in each of the following branches of the industrial arts covered by this journal:

1. **Metal manufacturing:**
   Work in the foundry, rolling mill and manufacturing plant, including molding, melting, alloying, casting, rolling, extruding, machining, stamping, spinning, soldering, brazing, hand-working, etc.
2. **Metal coating:**
   Cleaning, plating, polishing, finishing, coloring, lacquering, enameling, zincing, tinning, etc.

ALL original articles published throughout the year will be considered for the prizes by a separate committee for each branch of work covered, as outlined above. Names of committee members will be announced later. Awards will be based on value of articles to the reader as judged by the amount and importance of the practical and technical information contained. Members of the staff or associate editors of THE METAL INDUSTRY will not be eligible for this contest.

THE METAL INDUSTRY

With Which Are Incorporated

The Aluminum World, Copper and Brass, The Brass Founder and Finisher, The Electro-Platers' Review

Member of Audit Bureau of Circulations and The Associated Business Papers

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Editorial

Metal Industry Reviewed for 1929. Outlook for 1930

The year 1929 was a year of extremes—extreme optimism, extreme fear, extreme gains and extreme losses. Beginning as it did with all signs pointing to a prosperous year, it bore out these promises. It was undoubtedly one of the biggest years in the history of the American industry, but with characteristic American abandon it ended with one of the most astonishing declines in our memory.

The first three months were good and the second quarter was better, but these conditions might have been considered normal for a good year. What was surprising was that the third quarter, which included two summer months, also went forward at top speed. Where was the summer lull? It seemed to have been eliminated. The fourth quarter began to show signs of a slight slackening, but no one worried about them, because we were running into the fall season when "business was sure to be good." Suddenly the New York Stock Market, which had climbed to unprecedented heights, wavered, teetered back and forth for a while, and suddenly collapsed. Then it was discovered that automobile production had been slowing down, steel production had been falling off and textiles were still weak. Black pessimism took hold of our very volatile imaginations.

In this emergency, President Hoover acted instantly. He called meeting after meeting of leaders in different industries with the purpose of planning for increased outlays to be entered upon at once, within the economic limits of the ability of the industries involved. This was the time to spend capital sums for permanent improvements. As a result the railroads have budgeted expenditures for the coming year far beyond those for 1929; public utilities will increase their outlays. The states and the Federal government will plan for new building and for road construction to the fullest possible extent, Federal taxes are being immediately reduced, and by mutual agreement, labor and capital will keep the peace, by not asking for increased wages and not cutting wages.

It is most remarkable, perhaps, that business has been steadied just as rapidly as it seemed to be going into a panic, by the prompt action of the President and the full co-operation of industrial leaders. No attempt is being made to resume the boom, but it is pointed out, logically, that our situation is not such as to bring on an extended slump. This is not 1920 with its swollen inventories and inflated prices. Our inventories are low, our prices have been steadily falling, industry has been strongly entrenched by several profitable years and is in the main in a very strong financial position. Some of the sore spots of the last year or two are recovering their vigor. The coal business has improved and agriculture has also forged ahead somewhat.

The past year was tremendous. The coming year calls for careful guidance, steady hands and cool heads. A psychological depression can be as ugly as a decline which is really warranted. Our present situation does not warrant a real decline and it will be the effort of every clear headed business man to keep his fears from running away with him.

Metal Prices

In 1929, the general statement about all metals, if it had to be made, would probably make use of the words "steady to lower" more than anything else. However, this was not strictly true in every case. Copper, beginning at about 16.75 cents per pound, went up steadily to 20 cents, then during a period of stringency, shot to 24, and back again to 18, where it now rests, more or less unsteadily, perhaps, the outside market being lower.

Zinc has been fairly steady around 6.25 to 6.50 cents all year except for the last month or two in which it has fallen off to about 5.50 cents.

Tin has been steadily and unfailingly reactionary. About a year ago it was around 50; now it is under 40. Overproduction seems to be the main cause.

Lead has been steady, perhaps a little lower on the whole but not sharply so. It began the year about 6.35, climbed to 7 cents and is now about 6.10 cents.

Aluminum has been unchanged at 24.30 cents; also nickel at 37, both these metals being held by their main producers.

Platinum has been reactionary, dropping through the year from about $71 to $61.

Silver has also been very weak, beginning at about 57 cents and ending under 47.

Technical Developments

The major trend among both the metal working and electroplating industries of 1929 was a strong drift toward automatic equipment capable of doing large scale work with a minimum of labor. Conveyer belts, sand handling equipment, molding machines, mold handling equipment, large automatic and semi-automatic plating machines, automatic polishing and buffing equipment—these were the lines along which the managers of plants thought and the results were higher production at lower cost per piece. Interestingly enough, quality did not suffer, as this factor has long been known to be the weak link of quantity production. It seems to be accepted now that quality and quantity can go hand in hand.

Many individual items are worthy of special attention. Electric furnaces have assumed almost complete control of the brass rolling mills and are gaining a stronger place in foundries. At the same time the quality of refractories and crucibles has been pushed upward steadily, resulting in new long-life records in operation for these materials. Electric furnaces are taking hold for heat treating aluminum and red metal alloys.

A new type of brass melting furnace has been developed, gas-fired, using a rotating metallic retort as the metal container. Cupola melting of brass has had what seems to be a successful beginning which may lead it far.

In the plating field several points of interest stand out. Excellent work has been done at the Bureau of Standards on the problem of spotting out and also on the throwing power of chromium plating solutions. Cadmium has become increasingly important as an agency aiding in rust prevention. Much work remains to be done on both of these metals, however. A growing realization has taken place of the importance of proper control of operations in the plating plant covering the chemical control of solutions by analysis, and temperature control as well as voltage and amperage. An interesting and useful method of detecting pin holes in plated goods made further progress, the ferroxyl test, showing spots on treated paper in the presence of pinholes. Equipment, such as buffing and polishing machines, has undergone considerable refinement and improvement; the same applies also to electroplating barrels and, in even a larger measure, to

automatic and semi-automatic electroplating machines.

A long step forward was taken by the industry in agreeing upon standardization of buffing wheels with a reduced number of sizes and plys. This was in co-operation with the Bureau of Standards in Washington, D. C.

Economic Developments

From an economic standpoint, the metal industries are divided into several great classes (1) rolling mills (2) foundries (3) secondary smelters and refiners (4) electroplating, polishing and finishing plants (5) manufacturing plants, including stamping shops, cutting up shops (6) metal novelties, jewelry manufacturers, silversmiths, etc. In order to arrive at a correct analysis of any situation, these industries should be considered separately.

The rolling mills and fabricators had a tremendous year depending as they do to a considerable extent upon the automobile trade and the electrical industries. As the year closed, they were operating very slowly. Foundries are in very much the same position and their record has paralleled rolling mills to a considerable extent.

One large merger took place when the Kennecott Copper Company bought the Chase Companies of Waterbury, Conn.

Smelters and refiners have been busy and the terrific financial pressure which they have experienced in the past few years has been lightened a little.

The plating industry and its allied trades had probably the biggest year in their history as plating is still very much in the public eye.

Jewelry manufacturing has been fairly good.

Throughout the various branches, however, the same condition obtained as in previous years. Price margins were narrow and efficiency had to be at its highest for a concern to show good profits. No new industries of any size came into the field as consumers of metal products. Consequently all expansion occurred in known fields, due to their normal or perhaps greater than normal growth.

One cloud appeared on the horizon which, while as yet not very large, bids fair to provide a serious problem for the manufacturers of non-ferrous metals. The makers of stainless steel or "rustless" iron or whatever such mixtures can be called, have been extremely active. Especially important is an alloy steel containing 18 per cent chromium and 8 per cent nickel, which seems to have extraordinary properties (and at the same time, it must be stated, presents extraordinary difficulties in handling). The advent of such material seriously threatens the producers of non-ferrous metals in a number of places where they have always been considered safe.

So far as the individual metals are concerned, aluminum has continued its steady and swift expansion, helped by the growth of aviation and the introduction of aluminum into new fields, such as metal furniture.

Nickel has had a big year, spreading more and more widely into industrial peace-time uses. The consumption of copper has been enormous, but along lines already developed. No new fields of great size have been opened to zinc or lead.

Tin is in a difficult situation due to over-production and the unremitting effort of consumers to get away from it whenever possible. Producers seem to be taking steps, however, to contract and restrict production to consumer needs.

Silver has taken no radical steps forward.

Necrology

Among those of prominence in the metal industries who passed away during 1929 were the following:

Jesse L. Jones, Pittsburgh, Pa., Metallurgist, Westinghouse Electric and Manufacturng Company, and associate editor of THE METAL INDUSTRY.

Thomas A. DeVilbiss, President, DeVilbiss Company, Toledo, Ohio.

Cornelius A. Bickett, Chairman, Chicago Bearing Metal Company, Chicago, Ill.

John C. Codman, F. L. and J. C. Codman Company, Inc., Boston, Mass.

Dr. Rudolph Breves, President, Waukegan Chemical Company, Waukegan, Ill.

Clayton M. De Mott, Treasurer, Scovill Manufacturing Company, Waterbury, Conn.

George H. Braman, Production Superintendent, American Brass Company, Waterbury, Conn.

F. E. Westerman, General Superintendent, Michigan Copper and Brass Company, Detroit, Mich.

Henry A. Ross, President, Ross-Tacony Crucible Company, Philadelphia, Pa.

Edward L. Frisbie, Vice-president, American Brass Company, Waterbury, Conn.

Alfred H. Cowles, Sewaren, N. J.

George Rockwell, Secretary, International Silver Company, Waterbury, Conn.

Claude V. Marks, Secretary-treasurer, Ohio Brass Company, Mansfield, Ohio.

Parker D. Handy, Chairman, Handy and Harman, New York.

Charles S. L. Trench, C. S. Trench and Company, New York.

John Koenig, Founder, Aluminum Goods Manufacturing Company, Manitowoc, Wis.

Louis J. Krom, formerly managing editor of THE METAL INDUSTRY.

Outlook for 1930

Difficult as the situation is at this moment, it is safe to say that the worst features are over, of the depression which came upon us so swiftly in November. The outlook for the first quarter of 1930 is for reduced operations in comparison with the bulk of 1929, but probably up to the level of even good years preceding that one.

Automobiles, it is estimated, will be produced to within about 15 per cent of last year's total—not a serious drop considering the fact that 1929 was a record year for all time. Building operations seem to have scraped bottom in 1929 and are ready for a rise. It is to be hoped that this reversal will be rapid enough to permit work to be carried on in 1930 which will result in actual business rather than simply plans. The chemical industries look for a 10% increase over last year.

The electrical trades are expected to equal 1929. The railroads have pledged themselves to buy at an unprecedented rate. Utilities have come forward similarly with enlarged budgets for expansion and modernization. The coal industry is somewhat improved and the buying power of the agricultural section is somewhat higher than in the past two or three years. Industrial concerns which are in a strong financial position plan increased capital outlays for 1930. The Aluminum Company, for example, will spend $50,000,000 against $12,000,000 spent in 1929. Business leaders, like C. M. Schwab and Secretary Mellon, view the coming year with confidence.

A concentrated effort is being made in Washington to use proper planning and the allocation of funds for use in such times as these, to overcome what is technically known as the "normal operation of the business cycle." We have, as never before, an administration skilled and staffed to cope with economic affairs. It is no small factor in the hopeful attitude of the country that the administration has the problem so clearly in mind and is so industriously working on its solution.

It is the belief of THE METAL INDUSTRY that 1930, our 28th year, will turn out to be a good year; probably not as big as 1929, but certainly very much better than it seems at the present moment.

Correspondence and Discussion

Business Slump Unnecessary

To the Editor of THE METAL INDUSTRY:

Some say that not more than 2 per cent, some say 3 per cent, and still others 4 per cent, of the population have lost in the collapse of the stock market. Certainly not more than 5 per cent has been hit, and that has been largely loss of paper profits.

It is universally conceded that business generally is active and the volume good. We all know that we have the same farms with millions from the Government to help handle the crops. We have the same forests and mines—inexhaustible so far as this generation is concerned. The same factory buildings and machines; the same managements and employes, willing and anxious to work. The same amount of money to operate with, but cheaper and easier to get. Leaving out the 5 per cent that may have had a paper loss, we still have 110 millions with all they had before the crash to buy with, and with the same desires and needs for luxuries and comforts.

Therefore, if there is any slump in business, it is altogether psychological. Fifty years ago we might have been frightened into a panic, but surely in this enlightened age, with the above facts before us, the 95 per cent who have not speculated will not be such business cowards as to allow the pessimistic whines and groans of the 5 per cent to cause us to slow up appreciably in our program of progress. There is not the slightest reason why the paper loss of the speculators who brought it on themselves should force us to stand any real loss of values that is sure to come if we give way to fear and mistrust.

Will we be cowards in this land of the free and home of the brave? Or will we stand up for our rights and refuse to be stampeded into a real loss, in sympathy with an artificial loss?

Who is running this country, anyhow, the few speculators or the people who own, manage, produce and consume?

Louisville, Ky., W. HUME LOGAN,
December, 1929. President, Logan Company.

Brown Finish on Brass

To the Editor of THE METAL INDUSTRY:

I notice your Shop Problem No. 3002, entitled "Brown Dip for Brass Plate," in the November, 1929, issue. I would suggest in this respect that a good brown finish can be produced on brass in the following:

Sulphide of antimony	1 oz.
Caustic soda	4 oz.
Aqua ammonia	8 oz.
Very hot water	1 gal.

The solution is used hot, on either brass or brass plated goods. The finish produced should be covered with a good grade of lacquer.

Chicago, Illinois, ANDREW V. RE.
December, 1929.

New Books

Principles of Electroplating and Electroforming, by William Blum and George B. Hogaboom. Published by McGraw-Hill Book Company, Inc., New York.

This book is at present out of print. A new edition has been prepared and is expected to be ready for distribution in February.

Chemical Engineering Catalog—1929. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York. 14th annual edition; 8½ x 11½; 1205 pages; price, $3.00 for permanent ownership; free for use one year by qualified persons and firms; $10.00 to those not qualified; for complete terms address the publishers.

This well known compendium, now issued for the fourteenth year, contains so much information that its value to chemists, engineers, works managers, consultants, teachers and libraries cannot possibly be overestimated. Besides fully covering the subject of "where to buy," it contains a trade name index, a technical and scientific books section, classified index of chemicals and raw materials and a general alphabetical index. More than 2,000 manufacturers are listed.

Simplified Methods of Chemical Control. By L. C. Pan. Published by the author at College of the City of New York, New York.

Dr. Pan is instructor in electroplating at the College of the City of New York and has gained considerable renown as an authority on plating (see THE METAL INDUSTRY, December, 1929, page 581). In this paper, which was first presented before the educational session of the New York Branch last February, he gives a remarkably concise yet complete explanation of the use of various methods of determining the condition of a plating solution. He explains the use of charts for conversion so deftly as to be easily understandable by the average plater not versed fully in chemistry. The paper is now issued in the form of twelve loose-leaf sheets, ten of which are illustrative charts.

Tin, its Mining, Production, Technology and Applications. By C. L. Mantell, Ph.D. Published by The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York. 5½ x 9; 366 pages; price, $7.00.

A comprehensive study of the subject, covering all its aspects, from mine to consumer. The history of the metal and the statistical data regarding it are fully detailed. The various processes of mining, smelting, reducing, etc., as well as the applications of the metal are described skillfully. Such phases of its uses as alloys, plating, dipping, foil and collapsible tubes, compounds; its corrosion resistance to various materials, foods, etc.; the large subject of secondary tin recovery, detinning of tin plate scrap; and the analytical methods of testing for tin and testing of pig tins, etc., are all covered in this book. The volume is No. 51 of the American Chemical Society Monograph Series.

Government Publications

Obtainable from Superintendent of Documents, Government Printing Office, Washington, D. C., at prices mentioned, unless otherwise noted.

Thermoelectric Temperature Scales, by William F. Roeser, Bureau of Standards. Research Paper No. 99. 5 cents.

Efficiency of Machinists' Vises, by H. L. Whittemore and R. L. Sweetman, Bureau of Standards, Research Paper No. 91. 10 cents.

Effect of Oxidizing Conditions on Accelerated Electrolytic Corrosion Tests, by H. S. Rawdon and W. A. Tucker, Bureau of Standards. Research Paper No. 101. 10 cents.

Platinum and Allied Metals in 1928, by V. C. Heickes, Bureau of Mines. Pages 7-20 of "Mineral Resources of U. S., Part 1." 5 cents.

Annual Report of Director of Bureau of Standards. Miscellaneous Publication No. 102. Covers fiscal year ended June 30, 1929. 10 cents.

Proposed Specifications for Couplings, Pneumatic Hose and Spray Hose; and Couplings, Steam Hose. Obtainable from Federal Specifications Board, care of Bureau of Standards, Washington, D. C. Free.

Mineral Resources of the United States in 1928. (Preliminary summary.) Bureau of Mines, Department of Commerce. Compiled by Martha B. Clark from statistics furnished by the Division of Mineral Statistics. Introduction by Frank J. Katz.

American National Screw Thread Tables for Shop Use. I. Standard Threads (Coarse and Fine Thread Series) Miscellaneous Publication of the Bureau of Standards, No. 98. 10 cents. Also, the same, **II. Special Threads,** Misc. Pub., No. 99. also 10 cents.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical, Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN, A.B. W. J. PETTIS
W. J. REARDON P. W. BLAIR

Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE A. K. GRAHAM, Ph.D.
G. B. HOGABOOM WALTER FRAINE

Brass on Unbreakable Metal

Q.—We are sending you under separate cover a sample of metal known as "No. 7 unbreakable," together with a sample of brass solution for analysis.

We have been having some difficulty getting a good finish on this metal, due to the fact that it seems to blister in spite of everything we have been able to do to prevent it.

We would like to have you check over the sample of solution sent, give us an analysis of it and advise what is necessary to put it in shape to plate this metal, if it is the solution that is at fault. If the solution is O. K., will you kindly give us your advice as to how this type of metal may be plated most satisfactorily.

A.—Analysis of brass solution:

Metallic copper	3.82 oz.
Metallic zinc	2.96 oz.
Free cyanide	11.37 oz.

Excess of free cyanide is the cause of the deposit blistering. The zinc content is also too high. Would advise you to take ½ of the solution from tank, replenish with water, and then add 2 ounces of copper carbonate to each gallon of solution.

Your solution will then contain approximately 2.92 ounces copper, 1.48 ounces zinc and 1.68 ounces free cyanide per gallon.

If the deposit still blisters, flash the work in a warm cyanide copper solution for a few minutes before brass plating.

—O. J. S., Problem 3,922.

High Chloride in Nickel Solution

Q.—The nickel solution we are using now contains 1 gallon water, 4 ozs. nickel chloride, 6 ozs. ammonium chloride, 1/100 oz. cadmium chloride, 1/64 oz. hydrochloric acid. We are working this solution cold at about two volts. We find that we get a grey shade similar to a smudge. We would like to know if you can help us in working out a white and clean surface. We plate jewelry.

A.—The chloride content of your present solution is too great to produce a nice white nickel deposit on jewelry articles and we would suggest that you use the following formula:

Double nickel salts	6 ozs.
Boric acid	2 ozs.
Water	1 gal.

For a brightener, dissolve 1 oz. of cadmium sulphate in 1 pint of water and add 10 drops or 0.5 c.c. to each gallon of solution.

Operate solution at 80° F., with 2½ to 3 volts.

—O. J. S., Problem 3,923.

Hot Tinning Gray Iron Castings

Q.—Would you kindly advise as to the process of hot tinning gray iron castings of average size.

A.—Tinning gray iron castings presents a somewhat different problem than does malleable iron. More care must be taken with the preliminaries to secure satisfactory results.

The greatest cause of poor work on gray iron is from over-pickling or wrong pickling. Three methods of pickling are in use: sulphuric acid, muriatic acid, and hydrofluoric acid. Both sulphuric and muriatic attack iron in preference to the sand, causing a soft gummy surface which does not take as perfect a coating of tin as do those prepared in a hydrofluoric pickle or by sand blasting or rolling, which is the better method.

If castings have been over-pickled or have been made with rosin cores or black lead facing to give a smooth surface, or if grease or paint be present, they should be boiled in strong caustic or sal soda solution. Next, place in rolling barrel to polish, but do not roll too long, as the acid used will make surface of casting soft, preventing good coat of tin.

After rolling, the castings are placed in the storage tank and are ready to tin. Place the proper load in tinning basket; place for two or three minutes in boiling caustic soda solution; rinse thoroughly in boiling water; then dip in weak solution of muriatic and water (one part muriatic to 20 parts water) for two or three seconds. Next, dip in solution of concentrated muriate of zinc containing five pounds of gray granulated sal ammoniac per gallon of solution. Next, transfer to roughing, or first tinning, kettle which should be maintained at 500 degrees F., while in use. The flux for this kettle should be made by boiling a quantity of muriate of tin on top of the melted tin and adding quickly some white granulated sal ammoniac, which must be done before the acid is evaporated by the heat of the tin.

Trial alone will determine the proper consistency of the flux. This is one of the most essential points in securing a successful coating of tin in the roughing kettle. The flux must be kept in a thin liquid condition, free from lumps, etc.

The castings must be gotten into the tin as quickly as possible and kept there until they become as hot as the tin in the kettle, which will take from ten to fifteen minutes.

Next, skim dross from surface, take out castings and transfer to finishing kettle at 400 degrees F. Use pure beef tallow mixed with from five to ten per cent of palm oil to cover surface of tin from ½ to 1 inch thick. Only immerse castings for about two or three seconds in this finishing kettle, shake off surplus tin, and place in kerosene oil to set the tin and then rinse in cold water.

If temperature of tin is right, castings will be white, with good luster and finish. —W. F., Problem 3,924.

Nickel, Brass and Tin Baths

Q.—I am sending samples of nickel, brass and tin solutions for analysis. These solutions were here when I started work and I do not know much about their exact contents.

The nickel seems to plate well one day and poor the next, the plate turning dark and streaky during the bad spells. It plates well for three of four days at a stretch, sometimes. It will not plate die cast metal such as automobile door handles, motometers, caps, etc.

The brass solution produces a very light yellow plate. I would like to make it more of a red brass.

The tin plates dark and comes out with a black substance on it that must be removed with pumice stone. I do not know what the solution was made of and am not very familiar with tin in general.

A.—Analysis of nickel solution:

Metallic nickel	1.82 oz.
Chlorides	.07 oz.
pH	6.7

Nickel solution is in very poor condition. Add 4 ounces single

nickel salts, 2 ounces boric acid and 2 ounces sodium chloride to each gallon of solution. Also add 6 fluid ounces of C. P. sulphuric acid to each 100 gallons of this solution.

You will not be able to successfully nickel plate die cast work in this solution. For die cast work use a solution made from the following formula:

Double nickel salts	10 oz.
Boric acid	2 oz.
Sodium chloride	7 oz.
Sodium citrate	1 oz.
Water	1 gal.

Analysis of brass solution:

Metallic zinc	.28 oz.
Free cyanide	.29 oz.
Metallic copper	4.15 oz.

The copper and zinc content are in the right proportions for a red brass. The free cyanide content is low. Add 2 ounces of sodium cyanide to each gallon of solution. If this addition does not make solution plate red enough, raise the temperature of the bath until desired color is obtained.

To the tin solution we suggest that you add 2 ounces of caustic soda and 1 ounce of sodium cyanide to each gallon of solution.

—O. J. S., Problem 3,925.

Refinishing Nickel Silver, etc.

Q.—I have a lot of nickel silver and soft metals to re-silver and would like to do it without having to strip the old silver off entirely.

A.—The best method of refinishing nickel silver and soft metal work is to strip the old deposit entirely and start with the same operations that are used on new work.

If this is impossible for you to do, we would suggest that you polish or buff off the old silver, clean, flash in cyanide copper solution and then pass through a mercury dip before striking.

A silver strike is almost necessary for proper adhesion, although you may be able to get along without it by using the mercury dip. The dip is made by using ½ oz. bichloride of mercury, 1 oz. of ammonium chloride, 6 oz. sodium cyanide, 1 gal. water.

—O. J. S., Problem 3,926.

Rose Gold Plating

Q.—Please give formula for rose gold plating solution. I need a smut red for solid gold and gold filled work. I prefer to use a solution without current, if possible. If not, then advise as to solution to be used with current.

A.—Rose gold solution:

Potassium ferro-cyanide	2 oz.
Potassium carbonate	4 oz.
Sodium cyanide	¼ oz.
Water	1 gallon
Gold, as fulminate	10 dwt.

Temperature of solution, 175° F. use 6 volt current.

Relieve highlights with bicarbonate of soda, wash thoroughly, and flash in regular gold solution for uniform finish.

An imitation rose gold that is sometimes used on cheap novelty work consists of mixing chrome orange ground in japan with turpentine to the right consistency, then painting work and allowing same to dry, and relieving the highlights with a rag moistened with turpentine.

There are several different shades of chrome orange and you will have to decide which particular shade you wish for your class of work.

—O. J. S., Problem 3,927.

Silver Plating Hollow Ware

Q.—Please give me some information on the following silver plating solution:

Chloride of silver	3½ ozs.
Sodium cyanide	10 ozs.
Water	1 gal.

My tank capacity is 45 gallons. I use silver anodes, seven of them each 3 by 4 inches. All work is kept at least 7 inches from anodes. Plating is done at 1½ to 2½ volts. Our generator has 6 volt, 35 ampere capacity. The work is hollow ware.

After a two-hour plate is removed from the tank, it is good and white, but very difficult to scratchbrush (stiff and stubborn); and of course, this makes rouge buffing a hard job.

We have a suspicion that the generator, while giving sufficient voltage, does not supply the necessary amperage. Please advise us whether to get a larger generator or not.

Sample of solution is being sent to you.

A.—Analysis of silver solution:

Metallic silver	4.41 ozs.
Free cyanide	8.60 ozs.

The free cyanide content is a little high, but we do not believe that your trouble is caused by this, but by the high voltage being used; 2½ volts is entirely too high for a heavy deposit of silver unless agitation of the cathode is had. Would suggest that you procure a suitable rheostat so that you can control the voltage at ¾ or 1 volt.

A 35-ampere generator is quite small and the volume of work that you are doing should tell you whether you require a larger generator or not; 4 to 5 amperes per square foot is considered good practice.

—O. J. S., Problem 3,928.

Silver Plating

Q.—Am sending you a metal shell finished in a silver dip solution and also a small sample of the solution. I have also included a sample shell unplated. Please analyze and advise as to the ingredients of the solution, which produces the finish on the shell.

A.—Analysis of silver dip solution:

Metallic silver	0.20 oz.
Free cyanide	0.60 oz.
Carbonates	1.27 oz.

This dip would correspond to the following and it is one which is commonly used for your class of work:

Silver nitrate	1 oz.
Sodium cyanide	2 oz.
Sodium carbonate	2 oz.
Water	1 gallon

—O. J. S., Problem 3,929.

Speeding Up a Nickel Solution

Q.—I am sending you a sample of a nickel solution that has given me considerable trouble lately. Will you please analyze this and give directions for improving it? This solution plates very slowly and I would like to know how to speed it up.

A.—Analysis of nickel solution:

Metallic nickel	5.83 ozs.
Chlorides	.49 oz.
pH	5.4

Solution is high in metal and low in chloride. The pH is also too low.

We would recommend the addition of 2 ounces of sodium chloride and two ounces of boric acid to each gallon of solution. Also add 6 ounces of 26° ammonia to each 100 gallons of solution.

—O. J. S., Problem 3,930.

Tin Plate on Aluminum

Q.—Will you kindly let me have a formula for a solution which will put a tin plate on aluminum? If there is such a formula, kindly let me know how to control the solution.

A.—Formula for tin solution:

Sodium stannate	12 ozs.
Sodium acetate	2 ozs.
Caustic potash	1 oz.
Water	1 gal.

Use solution at 150° to 160° F., and a cathode current density of 20 amperes per square foot. Cleanse the aluminum in a mild alkali cleaner, rinse in clean cold water, pass through bright dip, then through a cyanide dip, and directly to the tin bath.

—O. J. S., Problem 3,931.

Patents

A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,723,922. August 6, 1929. **Copper Cobalt Alloy.** Michael G. Corson, Jackson Heights, N. Y., assignor to Electro-Metallurgical Company, a Corporation of West Virginia.

The method of treating copper to improve the physical strength thereof which consists in alloying it with 2 per cent to 5 per cent of cobalt, heating the alloy to a temperature above 850° C. and quenching from that temperature.

1,724,299. August 13, 1929. **Casting Having Chromium Alloy Surface.** Walter M. Mitchell, Philadelphia, Pa., assignor, by mesne assignments, to Electro Metallurgical Company, a Corporation of West Virginia.

A casting containing a base metal and a distinct surface layer comprising chromium alloyed with said base metal, the chromium content of said layer being greater than 25 per cent, the base metal of the casting containing 5 to 15 per cent of chromium throughout.

1,724,331 and 1,724,332. August 13, 1929. **Die-Casting Machine.** Walter O. Will and Eric Carlson, Chicago, Ill., assignors to Stewart Die Casting Corporation, Chicago, Ill.

In a die casting machine in combination with opposed die carriers and a frame in which they are mounted for reciprocation of one carrier toward and from the other, a cylinder having connection for hydraulic pressure, and a piston reciprocably mounted therein and connected for actuating the reciprocable die carrier.

1,724,395. August 13, 1929. **Die-Casting Machine.** David J. Conant, Memphis, Tenn., assignor to Westinghouse Electric & Manufacturing Company, a corporation of Pennsylvania.

A die-casting machine for casting rotors comprising a frame, a cross member supported by the frame, a plurality of cylinders disposed in the cross member, one of said cylinders constituting a reservoir for molten metal, a lower mold disposed on the reservoir for molding one end of a rotor.

1,724,818. August 13, 1929. **Brazing Alloy.** Andrew E. Averrett, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York.

An alloy containing about 54 per cent copper, about 36 per cent zinc and an appreciable amount but not substantially more than 10 per cent of silver.

1,724,896. August 20, 1929. **Copper and Lead Alloy and Process of Producing the Same With Varying Physical Properties.** Albert H. Ackerman, Chicago, Ill., assignor, by mesne assignments, to Ackermite Company, Janesville, Wis.

The process of producing bearing metal which comprises combining molten copper and lead in the presence of substantial amounts of each of sulphur, sulphide of antimony, sulphide of arsenic and oxide of arsenic.

1,725,445. August 20, 1929. **Precious Metal Plate.** Victor D. Davignon, Attleboro, Mass., assignor to General Plate Company, Attleboro, Mass.

That method of producing a plated product consisting of a layer of gold alloy on a backing of copper-aluminum alloy, the latter containing sufficient aluminum materially to reduce its specific gravity but not more than about 10 per cent by weight, and being sufficiently malleable to permit substantial attenuation thereof by rolling or drawing while cold.

1,725,780. August 27, 1929. **Process for Utilizing Light Metal Scrap.** Henry Chamberlain, Los Angeles, Calif.

The herein described process of forming a body of metal including intimately mixing scrap sheet metal and finely divided carbon, pressing the metal and carbon cold to form bales, heating the bales to about 2,200 degrees Fahrenheit, and then subjecting the heated bales to a high pressure to form solid bodies of metal.

1,725,877. August 27, 1929. **Electro-Plating.** Oscar L. Maag, Canton, Ohio, assignor to The Timken Roller Bearing Company, Canton, Ohio.

A device for positioning and holding in endwise abutment tubular articles to be electroplated internally which comprises top and bottom members and rods connecting the same, said rods being equidistant from a common axis and one of them being pivoted to one of said members and detachably connected to the other member whereby the closing of said pivotal rod centers said articles in the form of a continuous tube in contact with all of said rods.

1,726,194. August 27, 1929. **Process of Improving Aluminum Alloys.** Wilhelm Sander, Essen-Ruhr, Germany, assignor to the Firm of Th. Goldschmidt A.-G., Essen, Germany.

In the improvement of alloyed aluminum containing 1.3 to 1.7 per cent magnesium silicid, 1 to 1.4 per cent copper, and 0.3 to 0.7 per cent titanium, with or without 0.5 to 1.1 per cent manganese, the process which comprises mechanically working a body of said alloy, heat treating at 520° to 550° C., rapidly cooling and subsequently ageing at a temperature higher than room temperature.

1,726,308. August 27, 1929. **Electroplating Apparatus.** William J. O'Neill, River Forest, Ill., assignor to Elmer J. Mercil, Oak Park, Ill. An electroplating barrel including end walls of insulation; perforated panels between the end walls; bars of insulating material extending between said end walls and with which the adjacent sides of adjacent panels are assembled; conductors encased by said bars of insulation and provided with terminals projecting laterally through the bars to the interior of the barrel to contact with the electrolyte within the barrel.

1,726,336. August 27, 1929. **Galvanizing Apparatus.** Frend W. Brown, Apollo, Pa.

In a galvanizing machine, a container having a bath of spelter therein, means for directing sheet metal through the spelter, exit rolls for the sheet metal having relative lateral movement, substantially similar cylinders disposed at the opposite ends of one of said rolls, pistons cooperating with said cylinders and roll ends for controlling the positions of the latter, and means for supplying said cylinders with fluid under substantially similar conditions.

1,726,346. August 27, 1929. **Lead Refining.** Bruce Winfred Gonser, Woodbridge, N. J., and Calvin W. Haffey, Selby, Calif., assignors to American Smelting and Refining Company, New York, N. Y.

The process of recovering antimony from lead containing said antimony in comparatively large percentages which comprises rapidly heating said lead to a comparatively high temperature and alternately subjecting the bath to oxidizing and reducing conditions whereby volatile oxides of atimony are formed and passed off as a fume, and whereby non-volatile oxides which form a skim on the surface of the bullion are reduced to a volatile state.

1,726,473. August 27, 1929. **Coating Composition.** Wheeler P. Davey, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York.

A metal coating japan comprising water as a dispersion medium and a disperse phase comprising japan base comprising bituminous material, a drying oil and rubber having in the aggregate a density less than water and a finely divided solid having a density greater than water, said constituents being combined in such proportion that the disperse phase has substantially the density of water.

1,726,652. September 3, 1929. **Process of Making Protected Metal.** Frederick M. Crapo, Munice, Ind., assignor to Indiana Steel & Wire Company, Muncie, Ind.

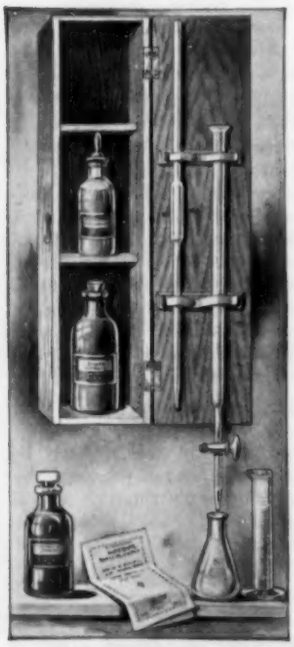
The process of zinc-coating an iron or low-carbon steel article, which consists in heat-treating the article at a temperature sufficiently high to produce annealing, separately immersing the article in a carbonizing bath of molten salts, and subsequently applying a zinc coating to the article.

Equipment

New and Useful Devices, Machinery and Supplies of Interest

Nickel Analysis Sets for Platers

The importance of a definite knowledge of the content of an electroplating solution has been pointed out repeatedly by authorities and the electroplaters are by now convinced of the necessity of control through actual chemical tests of their baths. Various equipment is being supplied for testing solutions for different constituents. The State Manufacturing Company, 4724 South Turner Avenue, Chicago, Ill., manufacturers of platers' and polishers' supplies and instruments for plating room control, now offer the Kocour Nickel Comparator, designed to give the plater a simple yet effective means of determining the nickel content of a solution.



Nickel Analysis Set

The company's description states that the comparator is simple, requires no particular skill or apparatus but is accurate in operation. It determines the actual nickel content of any solution regardless of the other ingredients, it is claimed, and readings are made to the nearest quarter-ounce of metallic nickel per gallon. The set operates independently of the acidity of the solution. The comparator principle is based upon the fact that the nickel content of a solution is proportionate to the green color of such a solution. Ordinary comparison of a sample of a solution with a sample of known nickel content, however, is said to be inaccurate, since the eye is incapable of detecting minute differences which may indicate large variations in the result.

In the Kocour set there is provided a neutralizer tube which is placed in front of a tube containing a sample of the solution to be tested. By looking through both tubes and matching the color seen through them with standard solutions provided in tubes in the set, the nickel content can be determined. The neutralizer tube prevents mistakes due to secondary colors in a solution that contains ingredients affecting the solution's color. The Kocour comparator set consists of a set of standard solutions in tubes, test tubes for holding samples of solutions under test, the neutralizer solution, all housed in a convenient wooden box which acts as a comparator block as well as a tube container.

Chemical Analysis Apparatus

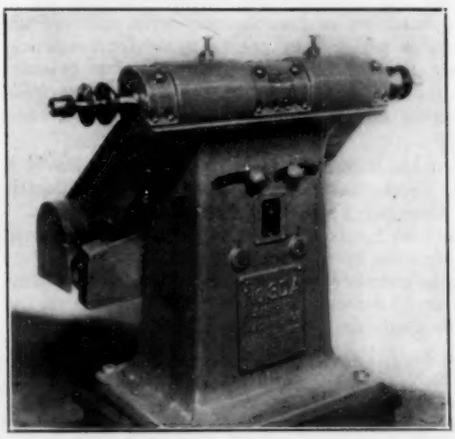
The company also manufactures a nickel solution analysis for use where the comparator method cannot be used to best advantage. This set consists of complete apparatus for determining the nickel content of any solution to within 1/20 oz. per gallon. It operates on the standard nickel analysis principle, does not depend upon color and is most practical for turbid solutions, besides being most accurate.

Its disadvantages are slightly higher cost as compared with the comparator, slower operation and necessity of replacing the solutions used in its operation. Readings are directly in ounces per gallon, no calculations being necessary. The method of operation is said to be simple enough for anyone to get accurate results the first time.

This set is housed in a cabinet which holds it while not in use and acts as a burette holder while in use.

Polishing Lathe

Gardner Machine Company, Beloit, Wis., has placed on the market a new double spindle polishing lathe equipped with the popular V-type multi-belt drive. The machine is known as the No. 3-DA and with the exception of the new type drive is similar to this company's No. 3-D lathe. Two single-end spindles are used to provide independent operation of the two ends. Each carries a multiple groove sheave and motor has double shaft extension mounted on a sliding bracket at the rear of base, carrying a sheave on each end of the shaft. These run idle on the motor shaft and are driven through a friction clutch mounted on the outer end of the shaft. Clutch shifters are operated through a totally enclosed linkage, terminating in handles located at front of base. By equipping the spindle ends with sheaves of different diameters, different speeds can be obtained for the spindles, any desired speed being thus obtainable. Many advantages are claimed



New Double Polishing Lathe, with Independently Driven Spindles

for the V-type multidrive, such as simplicity, positive and slipless action, cleanliness and efficiency. Belt strain is said to be removed and smoother drive obtained than with flat belts. Adjustment for various belt lengths is provided. Belts and sheaves are completely enclosed. The machine is stated to be exceptionally massive and rugged; base is solid, one-piece casting, and weight of machine complete with 5 h.p. motor is 1,225 lbs.

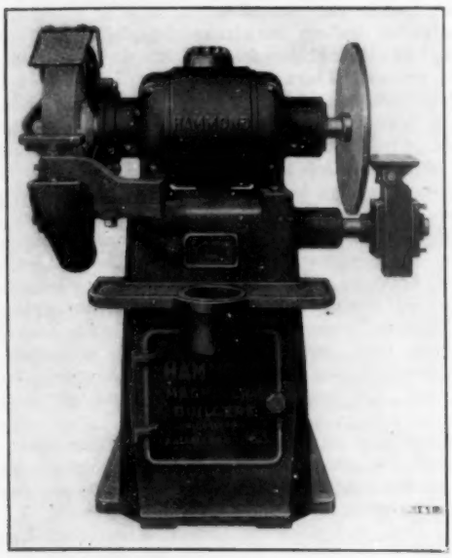
The motor is mounted on a bracket at rear of base, providing for compactness, the base measuring 30 by 25 inches. Specifications include Timken double row bearings on each end; 2¼ in. diameter spindle bearings; 3½ in. maximum thickness of polishing wheel; enclosed, fan-cooled type motor; magnetic starter with push button station mounted in recess on front of base; 5, 7 and 10 h.p. motors can be provided; weight for domestic shipment, 1,400 lbs. with 5 h.p. motor; for export, 1,750 lbs.; cubic content, approximately 70 cu. ft.

Chromium Plating Rack Enamel

A new waterproof rack enamel has been especially developed by the Maas and Waldstein Company, 438 Riverside Avenue, Newark, N. J., for protecting racks used in chromium plating. This preparation, manufactured by a well known manufacturer of lacquers and enamels, has been adequately tested, according to the makers, and has been found beneficial in protecting racks from the action of chromium solutions while supporting work on which chromium is being deposited. Complete data on this new product is available from the Maas and Waldstein Company, at the address given above.

Combination Disc and Production Grinder

A new combination disc and production grinder has been designed and placed on the market by the Hammond Machinery Builders, Inc., Kalamazoo, Mich. This machine is made in four sizes, 2, 3, 5, and 7½ h.p. capacity, for 220 and 440 volt, 25 to 60 cycles, alternating current, and 110 and 220 volt direct current. According



New Combination Disc and Production Grinding Machine for Foundries and General Use

to the makers, this is an ideal installation where disc grinding operations are limited, as the solid grinding wheel can be used for tool or casting grinding, rendering a dual service in the shop with average production. Standard equipment includes one steel adjustable wheel guard, steel disc, and plain table. Universal lever feed table can be furnished in place of the plain table if so desired. These machines can also be fitted with discs on both ends, with either the plain or universal lever tables, it is stated.

These, like all Hammond grinders, are equipped with totally enclosed 40 degree C type motor, fitted with air cleaner which supplies clean air to the motor windings, eliminating grit and dirt. They are equipped with push button control and automatic motor starter, having thermal overload protection, low voltage, and phase failure protection. The automatic starter is mounted on the inside of the pedestal door, for convenience of inspection and resetting. There are high-grade ball bearings, completely enclosed and protected from dust and grit by double labyrinth seals, and designed and mounted to take both radial and lateral thrust.

Liberal oil reservoirs are provided with convenient oil cups, oil level gauge and drain plug for ease of flushing the bearing chamber. The chamber is designed so that surplus oil will run out through overflow located at wheel end of bearing compartment, away from motor windings.

The discs are machined on both sides so that two disc wheels can be mounted at one time. After one is worn, the disc can be reversed. In this way the disc renders twice the number of service hours with one operation of changing and mounting disc wheels. Wheel presses for mounting discs are supplied to order.

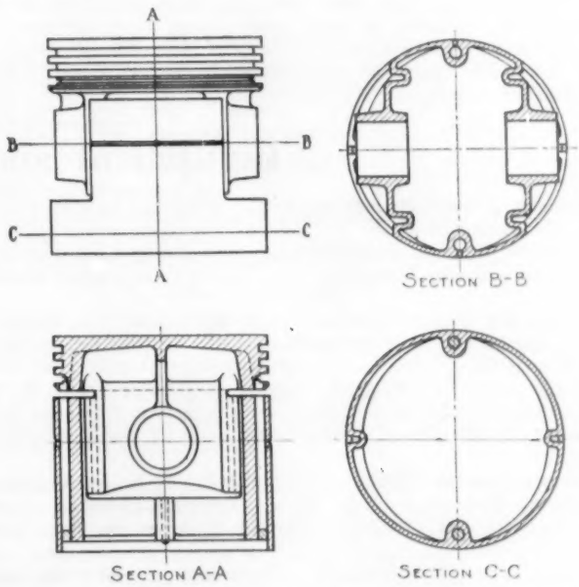
Generator-Operated Furnaces

The Ajax Electrothermic Corporation, Trenton, N. J., reports that as of November 25, 1929, there were in operation and on order a total of 6,040 Kw. of generator-operated furnaces in the United States. In Canada the total was 450 Kw., making a total of 6,490 Kw. for both countries. Included in the list were installations or orders for the following companies in the non-ferrous industries: American Brass Company, General Electric Research Laboratories, General Fire Extinguisher Company, Handy & Harman, Hoskins Manufacturing Company, Westinghouse Electric and Manufacturing Company, Anaconda American Brass Company. The furnaces listed range from 50 to 2,000 pounds metal capacity and use from one to three generators having ratings ranging from 50 to 600 Kw.

New Type Aluminum Alloy Piston

Wear occurs in pistons of automobile and other gasoline motors largely when cold motors are started. The wear, according to authorities, is caused by friction between the pistons and cylinder walls that have become dry while the motor was standing idle, its heat and action usually being necessary to provide the oil lubrication of the cylinder walls. Since the pistons expand almost at once, the motor on being started causes considerable wear before the lubrication begins. The excessive wear thus occurring in aluminum alloy pistons have rendered them not entirely satisfactory, says a pamphlet of the National Alloys Company, 2118 Woodbridge Street, Detroit, Mich., manufacturers of a new type of an aluminum alloy product known as the "Oilrite" non-friction piston. In regard to this new product, the company says:

The "Oilrite" piston is self-lubricating and designed to lubricate the cylinder wall thoroughly on the first stroke of the piston, eliminating the friction and wear on thrust skirts generally encountered, and providing a better compression seal for starting. Expansion difficulties inherent in all aluminum pistons, are obviated through the ingenious design of the piston. Two expansion "U"s are provided in each skirt strut of the "Oilrite," it is stated. These are designed to serve a dual purpose, to absorb the expansion of the struts and dissipate the heat conducted from the head of the piston through the struts to the skirt. This principle, it is claimed, has reduced skirt expansion to a degree equivalent to that of cast iron, and "Oilrite" pistons are fitted to the same



Section A-A and the Diagram Above it Show Construction of "Oilrite" Piston and Location of Oil Reservoir. Section B-B Shows Expansion U's. Section C-C Shows Expansion U's in Skirt Ring.

clearances as cast iron pistons. The specially designed oil reservoirs in the piston provide for lubrication of the cylinder wall the moment the piston is moved, and this method automatically provides also a sealing film of oil for the first compression stroke, which makes for easy starting without excessive choking of the motor.

"Oilrite" pistons are manufactured in standard sizes for all makes of motors and are supplied by service garages or can be obtained directly from the manufacturer.

Vapor Degreasing Process

A new vapor bath process for the degreasing of metals and other impervious materials has been developed by the Carrier Engineering Corporation, Newark, N. J., and will shortly be made commercially available.

In this process a solvent known by the Carrier trade name of "Cecolene" is boiled and vaporized. In the standard tank form

of the apparatus the vapor rises to the level of water-cooled condenser coils around the sides near the top of the tank, is condensed and precipitated to the bottom of the tank. Since the vapor is more than three times as dense as air there is no tendency to overflow or escape, it is stated.

The objects to be degreased are suspended in the vapor, which condenses on their cold surfaces at once and runs off profusely, carrying with it all grease. The objects are kept in the vapor until they heat up to its temperature, in from 1½ to 3 minutes, the time depending upon the gauge or weight of the metal or other material. They are then removed in a warm, perfectly dry and clean state, any foreign matter remaining being in the form of dust easily removable.

The objects being degreased do not come into contact with grease previously removed from other material, since the solvent vaporizes at a temperature much lower than the grease, which remains in the liquid below, the manufacturer states. Economy results from the fact that the chlorinated solvent can be used over and over, the vapor never becoming "dirty."

The vapor degreaser is to be made in standard dip tank units and in special designs adaptable to any size or style of continuous conveyor in line assemblies, and to steam, gas or electric heating. The makers are prepared to make surveys of any special degreasing problems.

"Cecolene" is a blanket term for a group of chlorinated solvents adaptable to various uses and materials, and the Carrier research is prepared to supply any needed variation of the formula for a special case.

Obvious uses for this device are in the degreasing of metal stampings, die castings, bolts and nuts, metal furniture, metal lacquerware, hardware of many kinds, motor parts, kitchenware, dishes, leather belts, brakebands, articles of glass, Bakelite, celluloid and many other products requiring a cleaning of grease before finishing or packing for distribution.

Polishing and Buffing Compounds

A complete line of polishing and buffing compositions for all purposes is offered by The Buckeye Products Company, 7020-34 Carthage Avenue, Cincinnati, Ohio, manufacturers also of core oils, core compounds, parting compounds, high-temperature cements, metal melting furnaces, foundry supplies, etc.

The company's bulletin No. 1, Vol. V, lists a number of compositions under the trade name "Speedie," which are designed for use on several specific varieties of work, such as white lime finish No. 53 for nickel buffing, auto trimmings, plumbing supplies, stove work, etc., being prepared in three grades: dry, medium and extra greasy. There is Tripoli No. 2, stated to be 100% pure tripoli, for heavy duty buffing of various kinds, including aluminum, plumbing supplies, job work, etc. The company has a number of other compositions, such as No. 80 chrome composition; No. 40 tripoli for high speed work, especially reflectors, being resistant to high heats; No. 54 tripoli, for average buffing on job work, aluminum, brass, etc., being a medium priced compound; coloring composition in two grades, dry and medium, for high lustre, on brass, copper or aluminum, lacquered metals, etc.; No. 44 tripoli, heavy in grease, for roughing out wheels for cast aluminum; No. 47 combination grease stick "B" for general job shop work; "Speedie" emery cake, containing pure Turkish emery, for polishing iron, steel, Monel, surgical instruments, etc., the company carrying Nos. 150, 180 and 200 in stock; No. 42, pure grease stick, for polishing aluminum, iron or steel; and others.

The company states that its compositions are reliable for the various types of work for which they have been developed. The makers test their products both in laboratory and under practical working conditions in order to insure dependable results, it is stated. Complete buffing and polishing catalog is available from the company, as well as samples of its compositions.

Equipment and Supply Catalogs

Correct Protection Against Fire. American-LaFrance and Foamite Corporation, N. Y. Fire extinguishing devices.

Erection Service, Refrigeration. Armstrong Cork and Insulation Company, Lancaster, Pa. Leaflet on corkboard insulation.

"Easy On" Pattern Letters. R. E. Byrd, Erie, Pa. Circular on a new type of letters for use in die casting letters with holes in them.

Inauguration of Regular Telephone Service from S. S. Leviathan. American Telephone and Telegraph Company and Associated Companies. Interesting booklet on sea-to-land telephones.

General Electric Company, Schenectady, N. Y., publications: Luminous Harmony in the Home; Looking Ahead in Aviation Lighting; Floodlighting; Electric Light on the Farm and in Rural Districts.

Truck-Type Switchboards. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Completely assembled, tested and inspected switching apparatus, factory built, ready for plant use.

Rite-Speed Electric Polishing and Buffing Lathes. Hammond Machinery Builders, Inc. (formerly Hill-Curts Company) Kalamazoo, Mich. Bulletin No. 10, illustrated pamphlet describing a number of new models.

The Smoke Marks Paul Revere's Foundry. Revere Copper and Brass, Inc., Rome, N. Y. An interesting broadside reproduction of one of the institutional advertisements this newly formed concern is using. Excellent printing and design.

The Ideal Electrical Principle Applied to Zinc Melting. The Ajax Metal Company, Electric Furnace Department, Frankford below Girard Avenue, Philadelphia, Pa. Pamphlet describing the newly developed Ajax-Wyatt furnace for zinc, similar to this type of furnace for copper alloys.

A Short Story of Two Wise Men. The Egyptian Lacquer Manufacturing Company, 90 West Street, New York City. An interesting manner of telling the story of the rise of one of the largest lacquer concerns in the country. Very nicely contained in a well printed booklet which should be requested before the supply runs out.

The Plating of Rolled Zinc and Zinc Base Die Castings. The New Jersey Zinc Company, 160 Front Street, New York City. Research bulletin by E. A. Anderson and C. E. Bernard, of the research division of this company. Compilation of data on the subject. Also, **Rolled Zinc,** issued by the same company, is a very complete discussion of all aspects of the application, treatment, chemistry, physical properties, etc., of rolled zinc.

Hanson-Munning Polishing and Plating Equipment and Supplies. Hanson-Van Winkle-Munning Company, Matawan, N. J. Catalog No. 109, showing the company's complete line of products, well known in the plating and finishing industry. The new book is up to the company's usual standard, being beautifully printed and illustrated. It is divided in four sections, covering buffing and polishing supplies, plating supplies, plating equipment, and buffing and polishing equipment. The company supplies every manner of equipment and supplies, including generators and large full automatic conveyors for electroplating, galvanizing, etc. The catalog just issued has 128 pages and is adequately indexed, making it a reference work worthy of a place in every plant.

The Season's Greetings

We earnestly thank all those who were so thoughtful as to send THE METAL INDUSTRY their greetings, calendars, souvenirs, etc., including the following:

American Brass Company, Waterbury, Conn.
Dr. R. J. Anderson, Fairmont, West Va.
William Bergfels, Newark, N. J.
General Electric Company, Schenectady, N. Y.
Isaac Goldman Company, New York City.
Joseph Haas, New York City.
A. L. Haasis, Joseph Dixon Crucible Company, Jersey City, N. J.
George B. Hogaboom, New Britain, Conn.
Magosy and Buscher, New York City.
Merck and Company, Inc., Rahway, N. J.
Mutual Chemical Company, New York City.
National Lead Company, Research Laboratories, New York.
Tauber's Bookbindery, Inc., New York City.
The Technical Press, New York City.
West Virginia Pulp and Paper Company, New York City.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

American Foundrymen's Association

HEADQUARTERS, 222 WEST ADAMS STREET, CHICAGO, ILL.

Plans for 1930 Convention and Exhibition

Selection of the Cleveland Public Auditorium for the 34th Annual Convention and the 23d Exhibit of Foundry Equipment, Machines and Supplies of the American Foundrymen's Association, to be held the week of May 12, 1930, was originally made primarily because of its exceptional facilities for housing this annual affair of the A. F. A. The Auditorium and Annex together afford accommodations for practically unlimited exhibit requirements in the way of space and power.

The management and exhibitors are planning to take full advantage of these unusual facilities, and they are promising to make the 1930 "show" the most outstanding foundry display ever held. The desirable location of the Auditorium will, in itself, do much toward making the meeting an ideal one both from the standpoint of the visiting foundrymen and the exhibitors.

Cleveland's hotels will accommodate the country's largest conventions, and most of these hotels are within easy walking distance of the Auditorium, situated in the downtown section of the city. This, and the fact that all convention sessions will be held in the meeting rooms of the Auditorium, will greatly conserve the time of both members and guests.

Exhibits will be thrown open at noon on Monday, May 12, in both Auditorium and Annex. The closing hour on Tuesday, Thursday and Friday will be 5 p. m.

However, arrangements have been made to hold all exhibits open on Monday and Wednesday until 10 p. m. This is being done for the accommodation of those who desire to take advantage of both the morning and the afternoon convention sessions, and the plant visitations scheduled.

An always-welcome feature of convention week is the Exhibitors' Dinner, which is scheduled for Tuesday evening, May 13. Another annual affair is the A. F. A. Subscription Banquet, to be given on Thursday evening.

An added feature of the exhibit this year will be an educational and technical display, which will be housed in the large, closed corridor connecting the Auditorium and the Annex. This exhibit will contain displays prepared by various committees of the A.F.A. and will include sand testing apparatus, apprentice contest material, exhibits of many engineering schools, castings, refractories and a metallurgical and physical testing laboratory.

The tentative program for the convention includes sessions on metallurgy, engineering practice, management and practical shop operation. Because of the varied interests of the members and guests attending the meeting, the sessions this year will be organized as to limit the subjects covered at any one meeting. There will be a sufficient number of sessions, however, to cover all the important phases of foundry practice.

Under the management section will be sessions on general management problems, apprentice training and foundry costs. Metallurgical practice in the four major branches of the industry will be brought out in the regular sessions, organized on lines similar to those in force at past conventions.

Of considerable interest every year are the informal round table luncheon discussion meetings, which will again be held at this convention. Three such round table sessions are scheduled, covering malleable, steel and nonferrous foundry subjects.

The shop operation courses, so popular at the past two annual meetings, will be broadened this year to include a course on the fundamentals of nonferrous shop practice. In addition, both of the two courses held in 1929 on gray iron and steel will be continued. They are being organized essentially for the practical shop man and will be conducted by leaders thoroughly familiar with shop problems. Each course will consist of three or four sessions, beginning at 4 p. m. on the days scheduled.

All convention sessions will be held in the excellent meeting rooms available in the Auditorium. The tentative schedule of sessions of interest to the non-ferrous trades as at present organized is as follows:

Tentative Program

Monday, May 12

10:00 a.m. Exhibition opening.
2:00 p.m. General opening meeting and business session.
4:00 p.m. Shop operation courses.

Tuesday, May 13

10:00 a.m. Foundry Costs (Nonferrous and Gray Iron).
12:15 p.m. Malleable Foundry Round Table.
2:00 p.m. Nonferrous Founding.
4:00 p.m. Shop Operation Courses.

Wednesday, May 14

10:00 a.m. Management.
12:15 p.m. Nonferrous Round Table meetings.
2:00 p.m. Sand Control.
4:00 p.m. Shop Operation courses.

Thursday, May 15

10:00 a.m. Apprentice Training.
2:00 p.m. Nonferrous Foundry Practice.
4:00 p.m. Shop Operation courses.

Friday, May 16

10:00 a.m. Materials Handling and General Foundry Practice.
5:00 p.m. Exhibition closing.

A number of authors new to A.F.A. programs will read papers on various foundry subjects at the 1930 convention. A partial list of those who have signified their intention of submitting papers, and the subjects to be covered by each is as follows:

Personnel Training, Dr. Harry Meyer, Frigidaire Corporation, Dayton, Ohio.

Cleanliness and Neatness of the Foundry as a Business Asset, J. J. Carroll, G. & C. Foundry Company, Sandusky, Ohio.

Application of Ingot Metal to Production of Brass and Bronze Castings, W. Romanoff, H. Kramer Company, Chicago.

Effect of Pin Hole Prosity on Properties of Sand Cast Aluminum Alloys, E. M. Gingerich and H. J. Rowe, Aluminum Company of America, Pittsburgh, Pa.

Heat Treating Cast Iron, F. J. Walls, Wilson Foundry and Machine Company, Pontiac, Mich.

Carbon and Sulphur Equilibrium in Cupola, J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.

Effect of Prolonged Heating at Various Temperatures on Cast Iron, R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee.

Steel Melting Problems, Geo. Batty, Steel Castings Development Bureau, Philadelphia.

Factors Affecting Machinability of Malleable Iron, H. A. Schwartz, National Malleable & Steel Casting Co., Cleveland.

Duplexing Process of Producing Malleable Iron, B. R. Mayne, Saginaw Products Co., Saginaw, Mich.

Foundry Sand Control from Producers' Point of View,

W. W. Kerlin, Enterprise Sand Company, Conneaut, Ohio.

Gating and Risering of Castings, E. Ronceray, Bonvillain and Ronceray, Choisy-le-Roi, France.

Technical Control of Brass Foundry Mixtures, H. C. Loudenbeck and A. M. Ondreyco, Westinghouse Air Brake Company, Wilmerding, Pa.

Induction Furnaces for Ferrous and Nonferrous Foundries, Manuel Tama, Berlin, Germany.

Institute of Metals Division

HEADQUARTERS, CARE OF W. M. CORSE, 810—10th STREET, WASHINGTON, D. C.

Progress in 1929

The division has prospered under the committee system originally suggested by Dr. Paul D. Merica, and the allocation of work made possible thereby has interested a large percentage of the members in division activities.

Nineteen hundred and twenty-nine was the year for an annual lecturer from abroad for the annual meeting in February, and we were honored by Ulick R. Evans of Cambridge, England, who lectured to us on "Corrosion." In addition to the annual lecture, Mr. Evans delivered a series of lectures in eastern United States, on allied subjects, all of which were very well received. Dr. Evans is an excellent lecturer and we were very fortunate to get him.

It so happened that we had planned a symposium on Corrosion which fitted in very nicely with Dr. Evan's own work. He was made honorary chairman of the symposium and it was generally thought to be the best we have ever had. Attendance at the meetings was very large.

At the annual meeting the division was signally honored by the award of the James Douglas Medal to Dr. Paul D. Merica, of the International Nickel Company. Dr. Merica has served the division in many capacities, the last being chairman, and everybody was pleased at the honor granted to him.

The fall meeting, held in Cleveland in conjunction with the National Metal Congress, was marked by larger non-ferrous exhibits than in any previous meeting. The technical sessions were excellent and one of the best was on the recovery of secondary metals.

The symposium proposed for the February meeting in 1930 is on "Melting of Metals" and "Absorption of Gases by Metals"—a most timely and valuable topic. Many practical and theoretical papers have been obtained.

The annual lecture for 1930 will be delivered by Samuel L. Hoyt of the General Electric Company.

G. H. Clamer of the Ajax Metal Company, Philadelphia, Pa., will be the speaker at the annual dinner of the division in February.

The division has operated since its connection with the American Institute of Mining and Metallurgical Engineers, under the provision in the constitution relating to divisional activities. At a recent meeting it was thought best to prepare a set of by-laws in addition to the constitutional provision, similar to those in use by the other divisions of the Institute. A committee was appointed and will report at the February meeting.

The division dinner at the fall and winter meetings is becoming a recognized feature of divisional activities. A. J. Wadhams of the International Nickel Company gave a most interesting and instructive talk on "The History of Nickel" at the Winter meeting in 1929, and Floyd T. Taylor of the Hanson-Van Winkle-Munning Company gave an excellent talk at the Fall meeting on "The Relation of the Metallurgist to the Electroplating Industry."

Those who attend the meetings are amply repaid because the committee in charge has made a great effort to secure outstanding men as speakers, to tell us in an informal way about the latest developments in their particular fields.

Persons who are interested in the metallurgy of alloys other than those of iron will find a membership in the Institute of Metals Division very much worth while. It is the outstanding group of technical people in the United States who are interested in these subjects. Membership in the division is obtained by joining the American Institute of Mining and Metallurgical Engineers, and there is no expense other than membership in the main Institute. The membership of the division is now approximately 1,360.

The division is further signally honored by the nomination of one of its prominent members, W. H. Bassett, technical director of the American Brass Company, a former chairman of the division, for the presidency of the Institute. The Nominating Committee, consisting of S. Skowronski, chairman, Jay A. Carpenter, G. H. Clevenger, E. P. Mathewson, E. W. Parker, F. B. Richards and Samuel A. Taylor reported the following nominations which were approved by the Board at the San Francisco meeting on October 8:

For Director and President—W. H. Bassett.
For Director and Vice-President—Henry Krumb.
For Director and Vice-President—Scott Turner.
For Director—R. C. Allen.
For Director—Cadwallader Evans, Jr.
For Director—John M. Lovejoy.
For Director—John A. Mathews.
For Director—Milnor Roberts.

—W. M. CORSE, Secretary.

American Electroplaters' Society

HEADQUARTERS, CARE OF GEORGE GEHLING, 5001 EDMUND STREET, PHILADELPHIA, PA.

The Supreme Society

A complete resumé of the activities of the American Electroplaters' Society as a whole is unavailable for use in this issue, but such a report is in preparation and will be published as soon as possible.

However, THE METAL INDUSTRY cannot publish its January number without some mention of the Society's fine work during the past year, and the furtherance of such work that is contemplated for the year just begun. By this is meant not only the obviously large matters such as the annual convention and meetings, but, and perhaps we should say "rather", the various Branch meetings, at which the platers are finding constantly more helpful to them in mastering their art.

THE METAL INDUSTRY wishes especially to thank all the Branches for their co-operation in sending in announcements and reports of meetings.

Baltimore-Washington Branch

HEADQUARTERS, CARE OF G. F. P. TURNER, 5324 MAPLE AVENUE, PIMLICO, BALTIMORE, MARYLAND

Annual Meeting and Banquet

The Baltimore-Washington Branch of the American Electroplaters' Society will hold its annual educational session and banquet on January 25, 1929. The events will take place at the Hotel Raleigh, Washington, D. C. There will be an educational session starting at 3 p.m., which will be followed by the annual banquet in the evening.

The members of the Baltimore-Washington Branch extend a hearty welcome to platers and their friends everywhere to attend the Annual Convention of the American Electroplaters' Society, to be held from June 30 to July 3, inclusive, 1930, at the Hotel Mayflower, Washington, D. C.

—GEORGE F. P. TURNER, Secretary.

Boston Branch

HEADQUARTERS, CARE OF A. W. GARRETT, 45 KING STREET, DORCHESTER, MASS.

December Meeting

The regular monthly meeting of the Boston Branch of the American Electroplaters' Society was held at the American House, Boston, on Thursday, December 5th, at 8:00 p. m. The meeting was called to order by President L. A. Gale. All officers were present. Communications and bills were read and approved. Under the head of new business the governing committee brought in a report approving Mr. Wood's offer to have all interested members attend a weekly educational meeting at his laboratory. President Gale instructed the secretary to write all members informing them of the opportunity.

Mr. Wood, as librarian, took charge of the educational part of the meeting. He read a technical discussion on hydrogen ion control and afterwards demonstrated the pH comparator, using two solutions with a distinct difference in the acidity. The colorimetric method of nickel determination, and an entirely new compact outfit for chemical determination of the chlorides in a nickel solution, accurate to one-third of an ounce per gallon and requiring no more than two or three minutes for the test, were also demonstrated.

From this point on a very general discussion was entered into by all present. Several new and interesting problems were brought up and everyone became so engrossed that the meeting had to be forcibly adjourned at 10:45 p. m.

—THOMAS JOHNSON, Secretary.

Chicago Branch

HEADQUARTERS, CARE OF J. C. KRETSCHMER, 1914 WARNER AVENUE CHICAGO, ILLINOIS

Annual Banquet, January 18

As previously announced, the Chicago Branch of the American Electroplaters' Society will hold its annual banquet on Saturday, January 18, 1930, at 7 p. m. The affair will take place in the Red Lacquer Room of the Palmer House, Monroe Street and Wabash Avenue, Chicago. During the afternoon, beginning at 2 p. m., the annual meeting and educational session will take place.

St. Louis Branch

HEADQUARTERS, CARE OF C. T. McGINLEY, 8214 FAIRHAM AVENUE, ST. LOUIS, MISSOURI

Annual Meeting and Banquet

The St. Louis Branch of the American Electroplaters Society will hold its annual educational session and banquet Saturday, January 25, 1930, at the Chase Hotel, St. Louis. The afternoon will be given over to a session with H. H. Williams as chairman. There will be a number of interesting papers. J. Hay of Detroit, Mich., well known for his "Efficiency in the Art of Electroplating," will be here to deliver a paper on "Modern Methods of Cleaning Metals for Chrome Plating." This paper will be illustrated with slides.

Dr. L. Stout, of Washington University, well known to the platers of this district, will give us a paper on a subject not yet announced but which we are certain will be of great value to all platers. C. Van Derau of Dayton Branch and F. C. Rushton of Los Angeles Branch are expected to be present, to take part in the program. We urge all platers to attend the meeting, regardless of distance. P. E. Miller of Evansville, Ind., some 225 miles away, is a member of this branch and attends all meetings. It should be as easy for anyone else to get here for a banquet and a meeting as it is for Mr. Williams to make the trip for ordinary meetings. In general, the branch is having unusually well attended and interesting meetings. Dr. Stout always has a worthwhile talk on some timely subject and he also takes active part in discussions and questions. Reservations should be addressed to E. J. Musick, 206 South 9th street, St. Louis, Mo.

Regular meetings of the branch are held the second Friday of each month at Central Y. M. C. A., with dinner, at 6.15 p. m.

—CHARLES T. McGINLEY, Secretary.

The Electrochemical Society

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK CITY

The Past Year

The past year has been another very successful one for the society. Two well attended meetings were held. At the spring meeting at Toronto the symposium was devoted to papers on "Electromagnetic Characteristics of Electrochemical Processes," a topic about which little is known. The discussion emphasized the interesting fact that a more careful consideration of the magnetic properties of the eons in solution would lead not only to a better understanding of metal deposition and other electro-chemical processes, but would also lead to new discoveries of importance.

Another session at Toronto was given over to a general discussion on the "Teaching of Electrochemistry." There are about as many different ideas on the subject as there are schools and colleges where the subject is taught. In general, there is a lack of good laboratory work accompanying the classroom work or lectures.

The fall meeting was held at Pittsburgh and the main feature was the day devoted to papers, plant visits and demonstrations emphasizing the many and essential contributions of electrochemistry to aviation. A large delegation of aeronautical engineers participated and contributed freely of their experience. Meetings such as these are bound to result in advancement of the art. The remarkable performance of the ZMC-2, the first all-metal airship ever constructed—and flown—is significant.

The Coming Year

Elaborate plans are under way for the coming convention, to be held at St. Louis the last three days in May, 1930. One session will be devoted to "Electrodeposition of the Less Common Metals." Another session will comprise papers on the hydrometallurgy of copper, nickel, silver, cadmium, etc. One whole day will be devoted to a visit to the lead mines near St. Louis.

The fall meeting of the electrochemists will be held in Detroit. The main feature will be an all-day session given over to a discussion on "Combatting Corrosion in the Automotive Industry." This should attract a wide diversity of contributors—electroplaters; paint, lacquer and enamel experts; manufacturers of corrosion-proof alloys, etc.

The Society's New Name

Starting with the new year the society takes on its new name. "The Electrochemical Society," reflecting the increasingly growing international scope of the society. No other society in the world covers exactly the same field.

—COLIN G. FINK, Secretary.

International Fellowship Club

HEADQUARTERS, CARE OF T. A. TRUMBOUR, BOX 183, WALL STREET STATION, NEW YORK CITY

Review of 1928

The International Fellowship Club has completed another successful year. During 1929 there were four important meetings, the first being held at Chicago in January, when the annual luncheon was held in conjunction with the annual meeting of the Chicago Branch of the American Electroplaters' Society. The next meeting took place in New York in February, when the New York Branch annual meeting and banquet was held. The Club held a luncheon and heard several addresses. When the annual convention of the American Electroplaters' Society was held at Detroit last August, the Fellowship Club again met and had one of the best sessions in its history, proving to be an outstanding feature of the convention. Fifty-six manufacturers and sales representatives were present; important speakers were heard; new officers were elected, as follows: Benjamin Popper, chairman; G. Cannon, vice-chairman; T. A. Trumbour, secretary.

The continued activities of the club indicate that its original

purpose, to promote high ideals in the plating and polishing supply field and to further the best interests of this industry in the most ethical manner, has been constantly kept in the minds of the members.

Annual Luncheon

The annual Good Fellowship Luncheon of the club will take place at the Palmer House Hotel, Chicago, Ill., Saturday, January 18, 1930, during the annual meeting of the Chicago Branch of the American Electroplaters' Society. J. P. Sangar, purchasing agent of the U. S. Gypsum Company, Chicago, and O. J. Prentice of the C. A. Dunham Company, Chicago, will speak. Reservations for the luncheon should be sent to Glenn Cannon, care of Matchless Metal Polish Company, 840 West 49th Place, Chicago, Ill.

—T. A. TRUMBOUR, Secretary.

American Society for Testing Materials

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

Review of the Year's Work

The American Society for Testing Materials has completed another active year of useful work in determining the various physical properties of a great variety of manufacturing and construction materials, as well as certain manufactured products. The several committees of the Society continued their work intensively with the view of setting tentative standards for the consideration of manufacturers and other interested organizations and individuals, and of advancing to standard those specifications which have met with sufficient approval to warrant such action. The following are resumes of the work of various committees affecting the non-ferrous metals and finishing industries:

Committee Activities in 1929

COMMITTEE B-3 on Corrosion of Non-Ferrous Metals and Alloys has continued, with slight modifications, to follow its program of long-time service tests in the atmosphere and in liquids, as outlined two years ago. The outdoor test racks have been installed and it is expected that the test specimens, which are now being machined and otherwise made ready, will be in position next spring.

COMMITTEE B-7 on Light Metals and Alloys, Cast and Wrought, was organized in December, 1928, with the formation of several sub-committees. The first work of the committee was to review the Tentative Specifications for Aluminum Ingots for Remelting (B 24-26 T); for Aluminum Sheet (B 25-26 T); for Aluminum-Base Alloy Sand Castings (B 26-26 T); and for Aluminum-Base Alloy Sand Castings in Ingot Form (B 58-26 T).

It was recommended that the first two specifications be advanced to standard. It was found that the Specifications for Aluminum-Base Alloys contained several analyses which had become obsolete; therefore it was considered advisable to revise the specifications from the ground up and a new list of aluminum-base alloys for sand castings has been prepared and circulated in the committee. This list includes not only the foundry alloys in more common use, but also the alloys which are heat-treated to develop high physical properties.

The sub-committee on sheets has submitted proposed tentative specifications for aluminum-manganese alloy sheet and aluminum-alloy sheet (duralumin). These specifications have been passed by a letter ballot of the committee.

COMMITTEE B-2 on Non-Ferrous Metals and Alloys has gone through a period of reorganization during the past year due to the transfer of its Sub-Committee II on Wrought Metals and Alloys and Sub-Committee III on Sand-Cast Metals and Alloys to become the new standing Committee B-5 on Copper and Copper Alloys, Cast and Wrought, and the reorganization of Sub-Committee VIII on Light Metals and Alloys to become the new standing Committee B-7 on Light Metals and Alloys, Cast and Wrought.

One activity of the committee has been pursued with particular vigor during the year, namely, the study of die-cast alloys by the Sub-Committee XV on Die-Cast Metals and Alloys under the chairmanship of H. A. Anderson. This sub-committee is carrying on an extensive investigation of 12 die-casting compositions including both zinc base and aluminum-base alloys. The investigation involves the making of tests on 50,000 specimens. The specimens made by various producers are tested by a number of cooperating laboratories. The data are then summarized and studied by means of statistical analysis.

Interesting reports on the microscopic analysis and the radiographic examination of the aluminum-base alloys were included with the annual report of the committee and similar studies are now being made of the zinc-base alloys. The committee also reported on die-casting progress in Europe. Under the auspices of the committee a very interesting paper was presented at the 1929 annual meeting by Sam Tour on "Aluminum Alloys for Pressure Die Castings."

Sub-Committee XV and Sub-Committee VII on Methods of Chemical Analysis are cooperating in the development of standard methods of analysis for zinc-base die-casting alloys. Sub-Committee VII is also cooperating with Sub-Committee XIV on Precious Metals and Alloys in the development of standard methods of analysis for silver solders. The scope of the latter committee has been enlarged so that the committee is now designated Sub-Committee XIV on Precious Metals and Alloys instead of limiting it to silver and gold solders.

The work of sub-Committee IV on White Metals has been quiescent during the year due to the possibility of the reorganization of this sub-committee as a separate standing committtee. The present trend apparently is to abandon the white metals in favor of copper-lead alloys for use in bearing work. It may well be that this type of bearing will supersede in automotive construction the bronze backed babbitt lined bearings now used.

COMMITTEE B-5 on Copper and Copper Alloys, Cast and Wrought, reports advancement to standard of the following tentative revisions of standards:

Revisions of Standard Specifications for Cartridge Brass (B 19-19).

Revisions of Standard Specifications for Cartridge Brass Disks (B 20-19).

Revisions of Standard Specifications for Seamless Admiralty Condenser Tubes and Ferrule Stock (B 44-24).

Revisions of Standard Specifications for Free-Cutting Brass Rod for Use in Screw Machines (B 16-18).

Revisions of Standard Specifications for Naval Brass Rods for Structural Purposes (B 21-27).

COMMITTEE B-1 on Copper Wire reports the advancement to standard of the Tentative Specifications for Bronze Trolley Wire (B 9-27 T).

Regional Meeting at Detroit in March

The first of the Society's regional meetings will be held at Detroit, Mich., March 19, 1930, under auspices of Detroit members acting through the Detroit district committee of which Vice-President F. O. Clements is chairman. The meeting represents a development that is expected to be of far-reaching importance in the Society's affairs as regards extending its work into various industrial areas of the country. Standing committees having been consulted, the spring group committee meeting will be held in the same week, at the Book-Cadillac Hotel, Detroit, where all meetings will take place.

A splendid technical program has been arranged for the Regional Meeting in the form of a **Symposium on Developments in Automotive Materials.** A careful selection of topics has resulted in twelve papers on materials by men of outstanding attainments and authorities upon their subjects. The non-ferrous metals features of the program in provisional form are as follows:

Symposium on Automotive Materials

Morning Session—Metals

1. Present-Day Methods in Production and Utilization of Automotive Cast Iron. A. L. Boegehold, Research Laboratories, General Motors Corporation.

2. Sheet Steel for Automobiles. W. H. Graves, Chief Metallurgist, Packard Motor Car Company.

3. Corrosion-Resisting and Heat-Resisting Steels for Automobiles. Charles M. Johnson, Chief Chemist, Park Plant, Crucible Steel Company.

4. Advances in Die-Cast Metals and Alloys for Automotive Use. Charles Pack, Consulting Chemist.

5. Developments in Light Metals and Alloys for Automotive Use. Zay Jeffries, Consulting Metallurgist, Aluminum Company of America.

6. Automotive Bearing Metals. Clair Upthegrove, Assoc. Prof. of Metallurgical Engineering, University of Michigan.

Metal Finishing Equipment Institute

HEADQUARTERS, CARE OF T. B. JORDAN, 74 TRINITY PLACE, NEW YORK CITY

Organization of Institute

The manufacturers and distributors of electroplating and polishing equipment and supplies have formed the Metal Finishing Equipment and Supplies Institute, to promote the standardization and simplification of the apparatus and supplies now regularly offered to the trade.

The Institute has for another of its prime objects a study of methods of eliminating waste, reducing costs, and the collection and dissemination of data and statistics of value to its members and users of their products.

The organization has had a prosperous first year and has made material progress in the work of standardization and simplification through co-operation with the Division of Simplified Practice of the Department of Commerce, in the elimination of excess varieties of buffs. Similar work in other divisions of the industry will be prosecuted as rapidly as practicable.

Officers of the Institute.

The present officers of the Institute are as follows: President, John M. Mayers; vice-president, Floyd T. Taylor; secretary, Thomas B. Jordan; director-counsel, Herbert S. Blake.

The following concerns have already become members of the Institute: Bruce Products Company, The Dias Buff and Wheel Company, Inc., Crown Rheostat and Supply Company, Divine Brothers Company, Eastern Felt Company, Electric Products Company, Frederic B. Stevens, Inc., The General Supply Company, Hanson-VanWinkle-Munning Company, Charles F. L'Hommedieu & Sons' Company, The Meaker Company, The Matchless Metal Polish Company, MacFarland Manufacturing Company, Reynolds-Robson Supply Company, George A. Stutz Manufacturing Company, Schwartz Manufacturing Company, Alfred T. Wagner, The Yerges Manufacturing Company.

Metal Findings Manufacturers

HEADQUARTERS, CARE OF H. R. BARKER, FULFORD MANUFACTURING COMPANY, PROVIDENCE, R. I.

Owing to the rapid rise in the prices of brass and other commodities essential in the jewelry findings business, several findings manufacturers recently met to consider the advisability of forming a findings manufacturers' board of trade or association. At that meeting a committee was appointed, consisting of Harold R. Barker of the Fulford Manufacturing Company, William G. Lind of T. W. Lind Company, Frank E. Farnham of the Jewelers' Supply Company, and William Whytock of Roland and Whytock. This committee met on March 22, 1929, and after careful consideration of the question of the advisability of forming such an organization it was decided to report that "such an organization would conserve the best interests of the business generally and be helpful to those in the business in many ways." The concerns represented at the meeting were Fulford Manufacturing Company, George H. Fuller and Son Company, Jewelers' Supply Company, Josiah Walsham Company, T. W. Lind Company, Providence Art Metal Company, Roland and Whytock, and A. Vester and Sons, Inc.

The officers of the new organization are Frank E. Farnham of the Jewelers' Supply Company, president; Ralph Gregory of Goodwin and Gregory, vice-president; William G. Lind of T. W. Lind Company, treasurer; and Harold R. Barker of Fulford Manufacturing Company, secretary.

The next meeting will be held June 12, 1930, and all of the findings manufacturers who join on or before that date will be charter members. The meetings of the association have thus far been held in the offices of the New England Manufacturing Jewelers' and Silversmiths' Association in the Biltmore Hotel, Providence, R. I. Future meetings will also be held there.

The name adopted for the new organization is The Metal Findings Manufacturers' Association.

Thirty-six firms have been found to be eligible to become members. Of these, twenty-eight have become charter members and others are considering the matter.

Business meetings are transacted in one hour. No oratory is in order. All the time is taken for business. This rule has been unanimously adopted at the suggestion of Mr. Farnham, president. By vote the secretary has been instructed to send letters to all the Rhode Island members of Congress soliciting a favorable vote upon the proposed tariff bill now pending in Congress.

—SECRETARY.

Personals

Thomas A. Wright

Thomas A. Wright, widely known metallurgical engineer, who is technical director of the firm of Lucius Pitkin, Inc., assayers and consultants, New York City, has taken an active part in the stabilization of the secondary metal industry during the past several years. Mr. Wright has done much to define the various classifications of waste and scrap metals, and has been active in several technical societies where the subject has been brought up.

Mr. Wright was born in New York City in 1887, of English-Scotch-Irish parentage. His father, now deceased, was a foundryman for fifty years. His mother is still living. Most of his childhood was spent in Elizabeth, N. J., where his father's occupation, no doubt, took the family. Mr. Wright is laconic on the subject of his education. "It isn't finished yet," he says, and that is about all one can gather from asking him, although his record bespeaks a thorough background in his field, which includes, besides the metallurgy of secondary metals and products, the analysis of platinum group metals and other non-ferrous metals and ores; the elimination and reclamation of waste; metallography of jewelers' and dental alloys; the study of smoke nuisances.

In 1903 and 1904 Mr. Wright was employed by the American Agricultural Chemical Company; from 1904 to 1907 he was with the De Lamar Copper Works as an assayer; then for a year he was chief assayer for the U. S. Lead Refinery. Since 1908 he has held various positions with Lucius Pitkin, Inc., starting as chemist and advancing steadily through the positions of chief chemist and secretary to the technical directorship which he now occupies. He is a licensed professional engineer in the states of New York and New Jersey. He belongs to about all the technical and scientific societies one man could handle without undue strain. These include the American Society for Testing Materials, where he is a member of Committee B-2; the British Institute of Metals; American Institute of Mining and Metallurgical Engineers, where he is a member of the Papers and Publications Committee of the Institute of Metals Division, taking care of all the secondary metals papers; furthermore, he is a member of the Committee on Arrangements for the 1932 Visit of the British Institute of Metals and the British Iron and Steel Institute; he is a fellow of the American Institute of Chemists, and a member of the Board of Governors of the Association of Consulting Chemists and Chemical Engineers. He belongs also to the National Association of Waste Material Dealers, in which he is chairman of the Committee on Definitions, and of the American Electrochemical Society. He is also a member of the Chemists and Watchung Country Clubs.

Mr. Wright is author of the following papers: "Sampling and Evaluation of Secondary Metals"; "The Relationship Between the Business and Technical Phases of Waste Disposal"; "Osmium Poisoning"; a Secondary Metals Review appearing in this issue; and a number of minor articles.

At home, Mr. Wright likes to cultivate flowers, which constitute one of his hobbies; another is public schools, he says. He has three children: a girl and two sons. One of his boys is a sophomore in the chemistry course at Rutgers College.

Dr. Blum Heads Electrochemical Society's Papers Committee

Dr. William Blum, chief of the Division of Electrochemistry of the Bureau of Standards, has been appointed chairman of the Papers Committee of the American Electrochemical Society. Because of the large amount of work which this post will demand, Dr. Blum has found it necessary to relinquish some of his extraneous duties, such as editorial work on THE METAL INDUSTRY. We must regretfully announce, therefore, that Dr. Blum has been forced to resign from the post of associate editor with THE METAL INDUSTRY.

Dr. Blum's record is too well known to our readers to need repetition in these columns. In our issue of August, 1929, we published a complete biography. However, the mention of some of the high lights of his career will not go amiss at this time.

Dr. Blum is joint author with Mr. Hogaboom of the leading book on electroplating, "Principles of Electroplating and Electroforming." He is a past president of the American Electrochemical Society. He was awarded, in June, 1926, the first medal of the American Institute of Chemists for his contributions in the electrochemical field. He is internationally known for his studies in electrochemistry and electroplating, and is universally respected for his untiring efforts on behalf of the electroplating industry of the United States.

It is with mutual regret that Dr. Blum and THE METAL INDUSTRY drop their official connection, but we shall continue to work together in every possible way in the cause of electroplating.

Howard Farkas, for the past few years sales manager of The U. S. Stoneware Company, 50 Church Street, New York City, has just been elected vice-president and a director of the company.

G. A. Schreiber, consulting engineer specializing in the automotive field, with offices in the General Motors Building, Detroit, Mich., and also at Berlin, Germany, will soon return from Europe, where he has been making a survey of the foreign automotive industry and attending to patent matters for clients.

E. Reed Burns Manufacturing Corporation, 21-27 Jackson St., Brooklyn, N. Y., announce that **Charles Meyn** of Syracuse, N. Y., is now their representative throughout New York State. Mr. Meyn is well known to the trade, both as a general sales representative and through his activities in the Purchasing Agents' Association.

F. H. Guthrie spoke on December 13th, 1929, before the students of the enamelers' training course which is being held in Cleveland through the courtesy of the Ferro Enameling Company. Mr. Guthrie spoke on factory production and cost methods. He is in charge of enameling production for the Wehrle Company, Newark, Ohio, large manufacturers of stoves and ranges.

Harry A. Schwartz, manager of research, National Malleable and Steel Castings Company, Cleveland, Ohio, has been selected to receive the 1930 major award of the American Foundrymen's Association, the John A. Penton Gold Medal. This award, which is made to Mr. Schwartz for his outstanding contributions to the foundry industry, has been approved by the Board of Awards and will be presented to him at the 1930 convention the week of May 12.

Dr. Irving Langmuir, president of the American Chemical Society and associate director of research for the General Electric Company, Schenectady, N. Y., has been awarded the Chandler Medal for achievement in science. The medal was presented to him last month at Columbia University by Dean George D. Pegram of the School of Pure and Applied Science. Dr. Langmuir, a graduate of Columbia, delivered the annual Chandler lecture, choosing as subject, "Electro-Chemical Intersections of Tungsten, Thorium, Caecium and Oxygen."

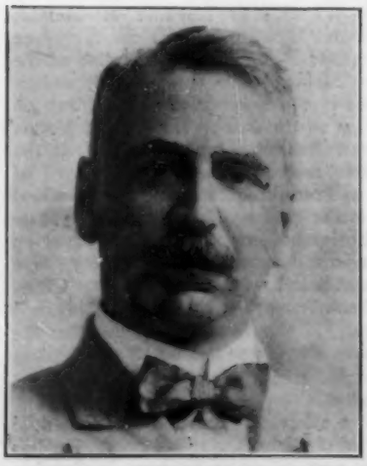
The Brown Instrument Company, Philadelphia, Pa., has appointed as its chief engineer **E. B. Nichols,** well known for his previous connections, and his activities in the A. S. M. E. Mr. Nichols was at one time chief engineer of the Pfaudler Company, Rochester, N. Y., subsequently holding the position of chief engineer of the Victor Talking Machine Company, Camden, N. J. Later he became associated with the Bell Telephone Laboratories, which connection he severed to join The Brown Instrument Company organization, where he will act in an administrative capacity, supervising the work of the engineering staff.

Ray M. Hudson has resigned as assistant director of the National Bureau of Standards, in charge of Commercial Standardization, Washington, D. C., effective December 31, 1929. Mr. Hudson, on January 2, 1930, will assume new duties as Secretary of the Massachusetts Division of the New England Council, with headquarters in Boston, Mass. Ever since his graduation from Syracuse University in 1908, Mr. Hudson has devoted his best efforts to the study of simplification, standardization and scientific management methods, and today is recognized nationally as an authority on the elimination of industrial waste. He has been a frequent contributor to technical, trade and business magazines, and has prepared the section on simplification and standardization for two successive editions of the Encyclopedia Brittanica.

Obituaries

Louis J. Krom

Louis J. Krom, well-known metallurgist, who was managing editor of THE METAL INDUSTRY for eleven years up to 1919, died December 23, 1929, at his home, 262 Oakwood avenue, Orange, N. J., in his fifty-ninth year.



Louis J. Krom

Mr. Krom was born in New York on August 13, 1870, the son of the late Stephen R. Krom, mining engineer and inventor. After primary education he studied at Stephens Preparatory School and graduated from Lehigh University. He became a metallurgist and for a number of years was connected first with Randolph & Clowes, and then with the Chase Rolling Mills, both of Waterbury, Conn. He came to THE METAL INDUSTRY in 1908 to take the position of managing editor. During his career with this journal he wrote a number of important metallurgical papers, including "The Manufacture of Wrought Brass," "Fluxes From the Viewpoint of the Metallurgist, "The Annealing of Brass Cartridge Cases," "The Development of the Rolling Mill," "The Manufacture of Seamless Tubes," "The Mechanical Tinning of Metals," "The Manufacture of Tin and Lead Foil," etc. In 1919, Mr. Krom left THE METAL INDUSTRY to take the position of works manager of what was then the new rolling mill of the West Virginia Metal Products Corporation, Fairmont, W. Va., and continuing his connection with the Journal as associate editor on rolling mill practice. He remained with the West Virginia company for about three years, after which he returned to New York to enter the consulting metallurgical field, in which he continued to be occupied until his death.

Mr. Krom is survived by his widow and a son, Frederick B. Krom, who is an assistant vice-president of W. A. Harriman & Company, New York.

Mr. Krom's death was a surprise and a shock to his former associates at THE METAL INDUSTRY office, where he had been a pleasant visitor for years, and had called but a few weeks ago, apparently in the best of health and spirits.

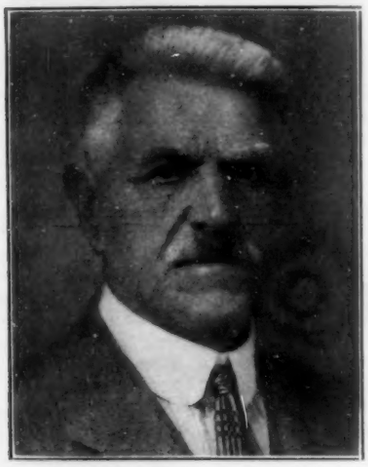
Frank A. Hunter

Frank A. Hunter, president of the Hunter Saw and Machine Company, Pittsburgh, Pa., died at his home in that city on November 19, 1929, in his fifty-seventh year.

Mr. Hunter organized the saw machine company with his brother, Harry A. Hunter, and had been president since his brother's death several years ago. For the past two years he had been in poor health and the business was carried on by his son, F. A. Hunter, Jr.

Joseph Koenig

Joseph Koenig, pioneer in the aluminum manufacturing industry, founder and vice-president of the Aluminum Goods Manufacturing Company, Manitowoc, Wis., died on November 15, 1929, at Two Rivers, Wis., after a heart attack which was induced by pleurisy, from which Mr. Koenig had been suffering for about a week. His death cast a shadow over Manitowoc County, Wis., where he was regarded as the father of the aluminum industry and one of the greatest industrialists the country has ever seen, as well as an inventor of importance.



Joseph Koenig

Joseph Koenig came to the United States from Germany as a boy. Here he became a mechanic, a teacher, a lawyer, real estate operator and, finally, a metallurgical and industrial genius. He became interested in aluminum when a German firm gave him charge of an exhibit of the metal at the Chicago World's Fair. Seeing the interest taken in it, he decided to exploit the metal, which was then a rarity. He began manufacturing on a small scale at Two Rivers, making aluminum combs. This was the beginning of the present Aluminum Goods Manufacturing Company, one of the largest concerns in the field today. Mr. Koenig designed and perfected much of the early machinery for working aluminum, and as he progressed more products were brought out in the metal. Within a comparatively few years there were three concerns in the Two Rivers district manufacturing aluminum products, and these were finally merged into the Aluminum Goods firm. Some years ago Mr. Koenig organized the Metal Ware Corporation, Two Rivers, which developed certain of his processes. When he retired, his late son-in-law, William Ellis, took charge of the Metal Ware concern, and since the latter's death, Remus Koenig, son of the founder, has been in charge. His son states that his father was active to the very last, constantly studying, experimenting, developing new ideas to serve humanity. He patented many products and methods during his life, one of which was the seamless army canteen of aluminum alloy, very widely used during the war and since.

Mr. Koenig is survived by his widow, his son Remus, a daughter and grandchildren.

Francis A. J. Fitz Gerald

Francis A. J. Fitz Gerald, consulting chemical engineer and a past president of the American Electrochemical Society, died recently at Niagara Falls, N. Y., in his fifty-ninth year.

Mr. Fitz Gerald was born in Dublin and graduated from Trinity College, Dublin University. He came to the United States as a young man and received the degree of bachelor of science from the Massachusetts Institute of Technology in 1895. He then was employed as a chemist by the Carborundum Company, Niagara Falls, remaining there until 1900, when he became a research chemist for the Acheson Graphite Company, Niagara Falls. In 1903 he organized the Fitz Gerald Laboratories, Inc., Niagara Falls, engaging in consulting engineering work on electric furnaces, electrometallurgy, etc. During his career he published many papers and articles in the technical press. He had membership in the Eleetrochemical Society, American Institute of Electrical Engineers, Faraday Society, Franklin Institute and the American Association for the Advancement of Science.

Wilfred Lewis

Wilfred Lewis, president of the Tabor Manufacturing Company, Philadelphia, Pa., until his retirement a year ago, died of apoplexy while on board the Steamship President Wilson, off Egypt about December 28, 1929. Mr. Lewis, who was seventy-five years old, was taking a world cruise with his wife. He was buried at sea.

Mr. Lewis, besides heading the Tabor company, which makes molding machines, since 1900, was a very noted engineer, the holder of over fifty patents, and winner of a number of important scientific and engineering prizes. In 1927 he won the Longstreth Medal of the Franklin Institute for perfecting a molding machine for foundries. He aided in development of war tanks during the world war.

Wilfred Lewis was accredited one of the world's great authorities on gears, and his contributions to the design and construction of gear teeth resulted in his receiving the American Society of Mechanical Engineers' award in 1927.

Wilfred Lewis

Mr. Lewis was born in Philadelphia and was graduated from the Massachusetts Institute of Technology in 1875. He joined William Sellers & Company, in Philadelphia, and was successively a mechanic, draftsman, designer, assistant engineer and director of the firm, which he left to become president of the Tabor Manufacturing Company in 1900.

From 1901 to 1903 Mr. Lewis was a vice-president of the American Society of Mechanical Engineers, and in 1912 he was chairman of the arts and sciences committee of the Franklin Institute in Philadelphia. He was a member of the Engineers Clubs of New York and Philadelphia.

Willard M. Scott

Willard M. Scott, president of the Philadelphia Branch of the American Electroplaters' Society, died on December 3, 1929, after a short illness. For some years Mr. Scott had been in charge of electroplating at the Frankford Arsenal, Philadelphia. He was also instructor of the electroplating class at the Kensington Evening High School and is remembered by all his pupils as a kindly and extremely capable teacher. He specialized in chemistry and the analysis of plating solutions.

Mr. Scott was born in Wilmington, Delaware, where he received his early schooling. Later he studied chemistry at Drexel Institute, Philadelphia, where he was highly proficient.

During his career he was held in highest esteem by his associates, especially by the members of the Philadelphia Branch, who feel the loss of their president keenly. Mr. Scott was very well known in the Electroplaters' Society in general. The Newark Branch expressed its sympathy by sending a beautiful floral piece to the funeral.

Willard M. Scott

which was attended by a large delegation from the Philadelphia Branch. Out of respect for Mr. Scott, the Branch omitted its meeting December 6th.

W. E. Gerlinger

W. E. Gerlinger, president of the Gerlinger Brass and Aluminum Company, West Allis, Wis., died at his home there November 3, 1929, in his fifty-sixth year. He was one of the most prominent of western foundrymen, having started many years ago and been instrumental in the organization of several important companies.

Mr. Gerlinger was born at Marysville, Kansas, in 1873. As a boy he went to Wisconsin with his parents. In 1892 he took a position with the Allis Chalmers Manufacturing Company, Milwaukee, where he remained until 1902, when he helped to organize the first converter steel foundry in West Allis and one of the earliest in the state. This operated under the name of Shaw-Gerlinger Foundry Company, his partners in the company being Solomon Shaw and C. A. Gerlinger. The company changed over to the manufacture of crucible steel in 1903, the name of the firm changing to Tobin-Gerlinger Casting Company. In 1906 the firm again reorganized, becoming the Gerlinger Steel Casting Co.

In 1914 this firm installed steel furnaces, some of the earliest to be used in the northwest. In 1919 the company merged with the Gerlinger Electric Steel Foundry Company, which Mr. Gerlinger had established, and he became president of the combine. He continued thus until 1927, when the company was sold to the Kearney & Trecker Corporation, Milwaukee. With his brother, George P. Gerlinger, he then established the Gerlinger Brass and Aluminum Foundry Company, becoming president.

W. E. Gerlinger

News of the Industry

Industrial and Financial Events

Scovill Buys A. Schrader Company

Subject to ratification by its stockholders, the Scovill Manufacturing Company, Waterbury, Conn., has acquired the entire capital stock of A. Schrader's Son, Inc., of Brooklyn, N. Y. The price has not been disclosed but the Scovill company proposes to issue $25,000,000 of 15 year, 5½ per cent debentures, of which it states "a substantial portion" will be used to finance the purchase.

The Schrader company manufactures tire gauges, tire valves, and tire tools. In addition to its Brooklyn plant it has a manufacturing plant in Toronto, Canada, and branch offices and warehouses in all the principal cities of this country, England, France and Australia. The company was formed by August Schrader in 1844 and later carried on by his son George. It is understood that all the stock was held by them and since their deaths has been held in trust. Schrader has been a heavy customer of Scovill's for 35 years, using brass and bronze products in its manufactures. The present management will continue under the Scovill ownership.

The Schrader concern employs about 2,000 men. It owns many patent rights and is considered to have valuable trade rights through having made its products widely known to the general public by national advertising and radio broadcasting. With its purchase Scovill will own six subsidiaries in addition to its two large plants in Waterbury. —W. R. B.

Hanson-Van Winkle-Munning Company

Controlling interest in the Kabushiki Kaisha A. P. Munning and Company of Kobe, Japan, has been acquired by Hanson-Van Winkle-Munning Company of Matawan, New Jersey. About two years ago, when the consolidation was effected between The Hanson and Van Winkle Company of Newark, N. J., and A. P. Munning and Company of Matawan, the latter owned control in the Japanese company, which was established to facilitate the distribution of, and meet the demand for, the parent company's products in the Far East. In addition to manufacturing buffing compositions, the company acts as Far Eastern distributor for all products of the Hanson-Van Winkle-Munning Company. J. M. Smith, who has been president of the Japanese company, will continue in that capacity.

Dallas Brass Company Expansion

Dallas Brass and Copper Company, Chicago, Ill., a division of Revere Copper and Brass, Inc., plans new construction to cost over $1,000,000 during 1930, according to C. D. Dallas, president. Plans are stated to include a new group of buildings at the company's 25 acre plant site at 6600 West Grand Avenue, Chicago.

Plans for the first of the buildings are now being worked out. While the matter of size is yet to be determined by requirements which have not been completely estimated, the structure probably will be the same size as the copper mill now on the ground. This building measures 150x280 feet and is a brick and steel structure of one story. It is possible, however, that the new building will be much larger, it was stated. The new construction will cost in excess of $1,000,000 and will materially augment present facilities, which are now being expanded through the approaching completion of a new engineering building and machine shop, 161 feet, 11 inches long and 111 feet, 9 inches wide; a carpenter shop, 159 feet, 5 inches long, and 61 feet, 10 inches wide and a 125x329-foot addition to the brass rolling mill which has total measurements of 281x329 feet. All of the structures are to be of brick and steel, one story high.

The construction now under way has a value in excess of $500,000.

With the announcement, Mr. Dallas stated that foundation work for the company's new administration building is now under way and that the structure which is to be two stories high, of reinforced concrete, with brick and stone exterior and with a frontage of 180 feet on Natchez Avenue and a depth of 65 feet, would be ready for occupancy in the Spring of 1930. The building will cost approximately $250,000.

Aluminum Output and Consumption

Dr. Robert J. Anderson, noted aluminum expert, issued his annual statement on the world aluminum output last month, declaring that 1929 saw record world production and consumption of the metal, with the United States continuing as largest producer of the primary metal, Canada next and Germany in third place. His estimate of world output last year is approximately 585,000,000 pounds, comparing with about 500,000,000 pounds

produced in 1928 and about 450,000,000 pounds in 1927. Dr. Anderson estimated last year's output to have been divided as follows:

United States, 198,000,000 pounds; Canada, 88,000,000; Germany, 85,000,000; France, 66,000,000; Norway, 55,000,000; Switzerland 48,000,000; United Kingdom, 22,000,000; Italy, 15,000,000; Austria, 6,000,000, and Spain, 2,000,000 pounds.

Aluminum Company Development Program

The Aluminum Company of America, Pittsburgh, Pa., will expend $50,000,000 in 1930, it was announced recently from the company's main offices. The allocation under the various budget headings has not been completed. One of the developments provided for in the company's budget for next year is the "normal continuation of expansion" of the New Kensington plant, it was stated. This will be included in an estimate of $15,000,000 for additions to plants fabricating strong alloys of aluminum. What portion of the $15,000,000 will be spent at New Kensington has not been fully determined.

The budget of the Aluminum Company of America for 1929 was $33,000,000, but only $15,000,000 of this will have actually been spent during this calendar year. This leaves an unexpended $18,000,000, which will be carried over into 1930. In addition to this, the 1930 budget will carry $12,000,000 for the development of power needed in the production of pig aluminum, $5,000,000 for added manufacturing facilities required in the production of pig aluminum and $15,000,000 for additions to plants fabricating the strong alloys of aluminum.

For some time there has been a demand for structural shapes possessing the strength of mild steel and the lightness of aluminum. A large share of the development program of the company is made up of expenditures for additions to plant facilities to meet this demand, company officials say. In 1929 a blooming and structural mill was erected at Massena, N. Y., capable of producing strong aluminum alloy structural shapes 14 inches in depth and 90 feet in length. The increasing use of aluminum in the building and architectural field makes necessary further additions by the Aluminum Company. Two of the most recent examples of this use are the Chrysler building in New York City and the Cathedral of Learning in Pittsburgh.

New Chromium Plating Plant

Evaco Industries, Detroit, Mich., E. V. Allen, proprietor, announces the establishment of a third plant at 93 Orchard Lake Road, Pontiac, Mich., which will employ 25 men at the start, and specialize in chromium plating of cooking utensils, bank fixtures, stoves and various kinds of hardware, in addition to automobile accessories.

E. V. Allen was connected with the General Chromium Company, Detroit, before starting in business for himself about two years ago under the trade style of Evaco Industries. He expects before long to increase the floor space of the Pontiac plant to 10,000 square feet. According to Mr. Allen, the chromium plating of cooking utensils is something new and gives promise of developing at a rapid rate, as the process permits the use of iron utensils with the added advantage of a hard smooth surface.

—F. J. H.

Brass Trimmings Firms Merge

Berdecker and Rowland Company, Waterbury, Conn., has been purchased by the Keeler Brass Company, Grand Rapids, Mich., and production of both companies will be concentrated at Grand Rapids. Both companies are engaged in manufacture of furniture trimmings of brass, the Waterbury concern being one of the oldest in the business. Announcement of the merging of the companies by purchase was made by Miner S. Keeler, president of the Grand Rapids firm, who stated that the move would center a large part of the brass furniture trimmings business of the country at Grand Rapids, where so many of the consuming furniture plants are located.

New Haven Sherardizing Company

Considerable damage was caused recently at the Akron, Ohio, plant of the New Haven Sherardizing Company by a fire which destroyed some of the company's equipment for plating. The company states that it is in the market now for plating supplies, equipment, generators, etc., and that unless unforeseen conditions arise it hopes to have its plant in full operation in a very short time.

Non-Ferrous Ingot Statistics

On December 1st, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute, Chicago, Ill., amounted to a total of 10,696 net tons, according to an announcement of the Institute.

The average prices per pound received by its membership on commercial grades of the six principal mixtures of ingot brass during the twenty-eight day period ending December 6th are shown below. (Until the program of standardizing the principal specifications, now progressing in cooperation with the American Society for Testing Materials, is completed, the following specifications will be understood to refer to "commercial grades.")

Commercial 80-10-10 (1% impurities)	16.652c
Commercial 78% metal	14.783c
Commercial 81% metal	15.239c
Commercial 83% metal	15.368c
Commercial 85-5-5-5	15.629c
Commercial No. 1 yellow brass ingot	12.433c

The combined deliveries of brass and bronze ingots and billets by members for the month of November, 1929, amounted to a total of 6,134 tons, according to the announcement.

Aluminum Food Cans Studied Abroad

A report to the Department of Commerce, Washington, D. C., from Norway states that most interesting experiments are being made in that country with a view to supplanting tin plate cans with aluminum containers for foods, which, it is declared, would revolutionize the canned food industry should the experiments prove successful. Fish canning has been tried first, some 50,000 cans being put up in aluminum, for domestic and export purposes. Claims are that the "can" taste is eliminated entirely by use of aluminum. Most serious obstacle has been price of the metal, which is considerable above that of tin plate. It is proposed to reduce the cost difference somewhat by embossing the cans instead of labelling, which is possible with aluminum and not with tin, which tends to rust when embossed. Experiments over the past year and a half at a large can factory in Norway are said to have more than fulfilled expectations of the Norsk Aluminum Company, sponsors of the experiments.

New Westinghouse Laboratory

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., will spend about $1,500,000 for the construction of a new central engineering laboratory and an addition to the present direct current power laboratory at East Pittsburgh, it is announced. The new construction is planned to replace numerous small units —laboratories, test stations, etc.—now scattered throughout its plant. The buildings will be 11 stories high, 80 by 225 ft. in area.

Copper for Repairs

It is interesting to notice that in the repairs to St. Paul's Chapel on lower Broadway, New York, a good part of the work consists of covering with copper many of the old carvings and turned posts. After being copper covered they are replaced, with the knowledge that their life has been greatly prolonged because of the corrosion resistant properties of this metal.

German Aluminum-Coated Sheet Mill

Reports from Germany announce the completion of a mill at Stockheide for the production of aluminum-coated steel sheets. It is stated that trial operation has given saisfactory results and that regular production aluminum-coated sheets has begun.

Mackintosh-Hemphill Company Moves

Mackintosh-Hemphill Company, Pittsburgh, Pa., recently ended a period of seventy years in one location and moved its general offices and engineering department from the original site at the foot of Twelfth Street to the Point Building at Penn avenue and Water street. The old property has been sold to the Pennsylvania Railroad for improvement work.

This company, which has played an important role in the development of industry through its engineering and production work in steel plant and rolling mill equipment and other machinery, traces its history back farther than 1859, when James Hemphill, Dr. W. S. Mackintosh, and N. F. Hart acquired a small shop at the site just relinquished by the present company. In 1803, the Pittsburgh Foundry, the first foundry in Pittsburgh, was founded by Joseph McClurg. A. Garrison and Company succeeded to its ownership in 1865. Calvin Adams established another foundry in 1837 which successively was known as the Jarvis Adams Company and the Pittsburgh Iron and Steel Foundries Company. Mr. McClurg and his son Alexander had established the Fort Pitt Works 12 years after their initial foundry venture, and in 1878 this company was acquired by James Hemphill and his partners to take care of their increasing business. The A. Garrison Foundry Company, Pittsburgh Iron and Steel Foundries Company, and Woodard Machine Company were merged with the Mackintosh-Hemphill Company in 1922, the Woodard Company having been established at Wooster, Ohio, by the Mackintosh-Hemphill organization six years previous.

All of these plants are rich in industrial history. The old Pittsburgh Foundry furnished cannon balls for Perry's Fleet in 1812. The first locomotive built west of the Alleghenies was a product of the Fort Pitt Works. Civil War ordnance was made at all of the plants.

Larger Use of Metal Auto Bodies Abroad

An expanded European market for American metal stampings and other metal equipment for automobile bodies was forecast by Charles H. Widman, vice-president of the Murray Corporation of America, on his return from abroad November 18. That demand, Mr. Widman said, will spring from the new European vogue in automobile bodies, the composite type, wood and metal, which is rapidly displacing the long familiar fabric body of the Continent. While the Continental trend is decidedly away from the fabric body, Mr. Widman found that English car manufacturers were slower to relinquish that type. Some concession is being made, however, toward the new vogue by combining fabric with steel or aluminum. He said there is still a good production of cars equipped with fabric tops, that is, fabric above the "belt line."

Shipbuilding Abroad Hits Metals Here

According to reports from Hamburg, Germany, some good-sized American shipbuilding contracts have recently been placed there. These include orders for 16,000 ton merchant ship, Diesel driven; a 17,000 ton tanker, Diesel driven; a 15,000 ton tanker, Diesel driven, for the Standard Oil Shipping Company, New York; a 2,500 ton private yacht; two 8,000 ton merchant ships. The placing of this business with foreign shipbuilders by American firms is regarded here as a definite loss to many American firms manufacturing products used in ship construction, especially non-ferrous and coated metals, such as brass, bronze, babbitt, galvanized ware, tubing of various types, the orders for which are placed largely with foreign producers by the shipbuilders abroad.

Photographs Taken on Untreated Metal

According to press reports from Ithaca, N. Y., a method has been discovered of taking photographs directly upon untreated metal by means of an appliance recently invented by Dr. P. H. Carr, graduate student at Cornell University. Dr. Carr explained the method, stating that it is based upon the fact that streams of electrons are capable of making impressions on metals and that the impressions thus recorded can be developed photographically. Since the metal plates used will record images projected upon them in full daylight, the discovery is regarded as providing a highly advantageous adjunct to photography.

Student Enamelers Enroll for Training

The annual Enamelers' Training Course, sponsored by The Ferro Enameling Company, Cleveland, Ohio, is now in progress in that city. The course is under the direction of J. E. Jansen, research engineer for The Ferro Enameling Company, assisted by G. H. McIntyre, chief chemist, and various members of the Ferro Enamel Supply Company. The students attending the classes are as follows: Hugh Grant and Russell Thomas, American Rolling Mill Company, Ashland, Ky., and Middletown, O.; John Andrews and Sam Eldridge, Newport Rolling Mills Company, Newport, Ky.; R. E. Stark, Crown Chemical Company, Pittsburgh, Pa.; Dr. H. E. Romine and Rudyard Porter, American Sheet and Tin Plate Company, Pittsburgh; P. J. Cooper, Canadian General Electric Company, Toronto, Ont.; F. H. Kohne, New Brighton, Pa.; Graham Bell, General Steel Wares, Ltd., Toronto, Ont.; E. R. Johnson, Central Alloy Steel Corporation, Canton, O.; B. N. Salzman, Toledo Porcelain Enamel Products Company, Toledo, O.; Charles Apperson, Electric Belle Range Company, Huntsville, Ala.; William E. Powell, Mr. Schermerhorn, Mr. Reehl, Mr. Schneider, William Irby, and Ralph Coombs, General Electric Company, Schenectady, N. Y.; Mr. Rose, Century Stove Company, Johnstown, Pa.; Grayson E. Via, Loth Stove Company, Waynesboro, Va.; Darwin Buckwalter, Buckwalter Stove Company, Royersford, Pa.; George Stevenson, Buffalo Porcelain Enamel Company, Buffalo, N. Y.; L. M. McClatchie, Jr., Beach Foundry, Ltd., Ottawa, Ont.

Tin Smelting Merger in England

A provisional agreement for the merger of four of the largest and most important tin smelting companies of the world, affecting about half the world's tin supply, has been made in London by the Anglo-Oriental tin interests, the Patino interests which lead in Bolivian tin production, and prominent members of the newly formed Tin Producers' Association, according to advices received from London last month by Doremus and Company, New York City. The announcement of the provisional agreement closely followed the action of the Tin Producers Association in calling for restrictions upon production in the Far Eastern tin fields, and is expected to have a far-reaching effect upon the stabilization of the industry. The new company will be by far the largest tin smelting organization in the world, it is stated.

The four smelting companies in the merger are the Cornish Tin Smelting Company, the Eastern Tin Smelting Company, the Penpoll Tin Smelting Company and Williams, Harvey and Company. Under the provisional plan a holding company will be formed with an authorized capital of £5,000,000.

Zinc Sheet Cartel Proposed Abroad

Reports from Hamburg, Germany, state that European producers of zinc sheet are expected to form a cartel, or production and price controlling association, since the Belgian producers, as yet not organized, are said to be negotiating with the German cartel which has been in effect for some time. The German cartel controls 75 per cent of the export sales of German zinc sheet and all of the Polish, Austrian, Hungarian and Czechoslovakian production. This gives it some 105,000 tons of zinc sheet annually for export. Belgium exported about 56,000 tons in 1928.

The original Continental Zinc Cartel, to which most of the European producers of the metal belonged, recently broke up due to a lack of power over its members, who voted for measures which some of them later did not observe. The dissolution of this cartel has given rise to the movement to form the sheet association.

Africans Barter for Copper and Brass

Writing to the New York Times Magazine, A. W. Banfield, Coquilhatville, Belgian Congo, states that simple barter is the chief method of purchase in the interior of Africa. He mentions, however, that trading commodities is supplemented in certain parts of Africa by the use of copper and brass rods, which serve as currency. These were originally about 18 inches long, but due to changes in European paper money purchasing power, the rods have of late shrunk to about 9 inches, although the buying power of each remains the same. Other articles used for currency are brass tacks, safety pins, needles, crosses of copper, etc.

Business Reports of The Metal Industry Correspondents

New England States

Waterbury, Conn.

Review of the Year

Business in all the brass and brass goods factories during the past year reached the high point since the war. Although last January there was some apprehension, activities in all the factories increased by leaps and bounds until about the middle of the year, when they reached their peak. Since then there has been a gradual recession that apparently justifies the foreboding felt now. Most of the factories are operating on reduced schedules, or holding off their copper buying, expecting lower prices. The general impression seems to be that industrial activities will be moderate until the latter half of 1930.

One of the big events of the year was the purchase last May of the Chase Companies, Inc., with all subsidiaries, by the Kennecott Copper Company. Earnings statements for Chase, issued for the first time, show the concern earned $14.08 a share in 1928, for the first four months of 1929 it earned $8.73 a share. The balance sheet showed total assets of $29,957,408.

The American Brass Company bought the business of the Randolph-Clowes Company in July and stopped operations there in September. The land and buildings were not purchased and are now for sale, consisting of 20 factory buildings and railroad track frontage. The American Brass bought the French Manufacturing Company in March at an unstated price. The latter company had been in the habit of buying thousands of pounds of metal a month from the American Brass.

Leavenworth P. Sperry, former secretary, was elected treasurer of the Scovill Manufacturing Company in June, succeeding the late C. M. DeMott. William M. Goss was elected secretary and Chauncey P. Goss was added to the list of vice-presidents of the company. In August, George A. Goss, vice-president and superintendent of the manufacturing departments, resigned the latter office but retained the former one and Albert Luscher was appointed superintendent of manufacturing.

Henry Weyand succeeded A. A. Tanner as president of the Lux Clock Company, the latter becoming chairman of the board. As a result of the purchase of the Berbecker and Rowland Company by Beardsley and Wolcott Company, C. W. Schwank was made vice-president in charge of sales and Robert S. Booth vice-president in charge of manufacturing of the latter company. Both were formerly officers of Berbecker and Rowland.

Clark S. Judd, formerly vice-president in charge of the Kenosha plant, was made vice-president in charge of manufacturing in all subsidiaries of the American Brass Company.

The Anaconda Wire and Cable Company, a subsidiary of the Anaconda Copper Mining Company, was formed to take over the American Brass Company's wire mill at Kenosha. The Scovill Manufacturing Company changed the name of the American Pin Company division to the Plumbers' Brass Goods division.

The Waterbury Fastener Company of this city merged with the United States Fastener Company of Boston. A new concern, the Manufacturers Finishing Company, formed here with a capital of $50,000 to manufacture small brass goods.

Among additions built during the year was one 391 by 62 feet, costing $75,000, to the Scovill plant; a large addition by the Lux Clock Company; an addition of 2,800 square feet by the Chase Companies; of 2,000 square feet by the American Brass Company; of 3,500 square feet by the Chromium Corporation of America. Another addition is planned by the Scovill company. The latter during the year increased its dividend rate from 75 cents to $1 a share a quarter.

Industrial leaders of Waterbury who died during the past year include: Clayton M. DeMott, former treasurer of the Scovill Manufacturing Company, who died in May; Edward L. Frisbie, executive vice-president of the American Brass Company, who died at the age of 75 in July, George H. Braman, production superintendent of the American Brass Company, who died in June at the age of 59; and Herbert S. Rowland, former head of Berbecker and Rowland Manufacturing Company, who died last January.

Review of the Past Month

JANUARY 2, 1930.

The property of the **Lane Manufacturing Company** on North Elm street has been sold in two parcels. The plant has been idle for nearly a year. The **J. L. White Company,** welders and cylinder grinders, has secured the southern section of the lot, including the factory, and the **General Manufacturing Company,** which has a factory adjacent to the northern section has purchased that portion. The **Lane Manufacturing Company** is one of the oldest manufacturing concerns of the city, having manufactured small metal goods for over half a century. **Harry B. Lane** and his family own practically all the stock. The company will be liquidated.

Although there has been a slight recession in industry, the Chamber of Commerce predicts a gain in momentum with the new year. It reports a decrease of 691 persons employed in the 46 representative factories in November as compared to the previous month and a decrease of 1,276 as compared with November, 1928. Bank clearings, however, showed an increase of $4,100,700 over October and a small increase over November, 1928. There was a net loss of $678,434 in savings accounts, as compared with the same 1928 month. During November, six factory additions, at a total estimated cost of $80,000, were started. Plant expansions representing total investment of close to $80,000 were reported for the month by the **American Brass Company,** the **J. L. White Company,** the **Platt Brothers Company** and the **Waterbury Battery Company.**

Most of the plants here closed for only one day at Christmas, but the **Waterbury Clock Company,** as usual, shut down for two weeks for inventory. Most of the plants are operating on a reduced schedule and have small stocks of copper on hand as the expectations are that the price of the metal will decline in coming months.

Among promotions announced by the **Scovill Manufacturing Company** are: **Grover C. Baldwin** from supervisor of the general engineering department to engineer of the finishing department; **Edward Sanderson, Jr.,** from purveyor in the production office to assistant to Sales Manager **F. S. Hyde.**

John H. Goss, vice-president of the **Scovill Manufacturing Company** and vice-president of the **Manufacturers Association of Connecticut,** presided at the third annual banquet of the **Naugatuck Valley Industrial Traffic Association** here December 3. Concerns in Torrington, Naugatuck, Shelton, Derby and Ansonia were represented. **A. H. Shaw,** passenger traffic manager of the Pennsylvania Railroad, and **Henry W. Conner,** eastern traffic manager of Transcontinental Air Transport Company, spoke.

The Waterbury Clock Company Aid Association celebrated its 50th anniversary last month. It is the oldest industrial aid association in the United States. During the last 25 years it has paid $79,921 in benefits. Of every dollar paid in, 89 cents went for benefits, with but 11 cents for management.

E. O. Goss, president of the Scovill Manufacturing Company, was one of the speakers at the annual meeting of the **New England Council** at Boston last month. John F. Rolfe of Hartford, speaking of industrial conditions in this section, and pointing out that a pessimistic attitude is unwarranted, said that Connecticut still produces 80 per cent of all the rolled brass and copper of the country, 40 per cent of all bronze and brass, 40 per cent of all hardware, 45 per cent of all firearms, 66 per cent of all silverware, 75 per cent of all clocks, and 60 per cent of all machinery.

—W. R. B.

Connecticut Notes

JANUARY 2, 1930.

NEW BRITAIN—Stockholders of the **Stanley Works** have approved a recommendation that the capital stock be increased from $10,400,000 to $13,000,000 by a 25 per cent stock dividend. Stockholders of record November 25 participated in the dividend. The regular dividend of 2½ per cent on the common was declared payable January 2 and the regular dividend of 1½ per cent on the preferred is payable February 15. **The American Hardware Corporation** has declared a special dividend of $1 in addition to the regular dividend of $1, payable January 2. **Landers, Frary and Clark** have declared an extra dividend of $1 in addition to the regular dividend of 75 cents, also payable January 2.

Rodman Chamberlain has been appointed sales manager of the **Stanley Electric Tool Company**, the new subsidiary of the **Stanley Works**. **Frank Martin** becomes district manager for New England sales and **Sheridan McClellan** is district manager for the Middle West. The new subsidiary has acquired the **Unishear Company** and the **Ajax Electric Hammer Company** of New York.

President Arthur G. Kimball of **Landers, Frary and Clark** acted as toastmaster at the Foremen's Night banquet of the **New Britain Industrial Council** last month.

During the past year, **E. Allen Moore** resigned as chairman of the **Stanley Works** and the office was abolished. **Philip Stanley** resigned as vice-president and **R. E. Pritchard** and **Ernest W. Pelton** were elected vice-presidents. Also during the year the **Stanley Works** acquired the **R. L. Carter Company** of Phoenix, Penn.

BRISTOL—Directors of the **Bristol Brass Corporation** have voted to pay $14 a share in accumulated dividends on the preferred stock. This brings the total paid during the year to $26.25 and clears up all the accumulations. Common stock is now expected to be put on a dividend basis. The company's 1929 business was the best since the war. It is reported that 1929 earnings after preferred dividends and other charges will be approximately $9 a share.

During the past year a large building program has been brought to a conclusion in local factories. **The Wallace Barnes Company** built three additions, increasing its floor space 50 per cent. **The New Departure Company** built a five-story addition containing 232,000 square feet. **The Wallace Barnes Company** purchased the Cook Spring Company of Ann Arbor, Mich.

BRIDGEPORT—The directors of the **Bridgeport Brass Company** have declared a special dividend of $2 a share, payable January 2. The last regular dividend was $6 a share, paid last January.

During the past year the **Bridgeport Brass Company** built two large additions and the **American Tube and Stamping Company** built a hot strip rolling mill 360 feet long. The **Industrial Development Corporation**, which has a new treatment for copper, located here. **Bullard Machine Company** adopted the use of "Widia," or "Carboloy," the new cutting metal.

HARTFORD—Pratt and Whitney Aircraft Company has started to move into its new plant in East Hartford. The new plant consists of one building 180 by 50 feet, two stories high, another of one story, 1,000 by 400 feet, and an engineering unit of three stories. The company is to put a new 300 h.p., nine-cylinder, air-cooled, radial aircraft engine on the market soon, according to **President Frederick Rentschler**.

Philip D. Wagoner, president of the **Underwood Elliott Fisher Company**, denies rumors that the local typewriter plant of the company is to be moved.

The Arrow-Hart and Hegeman Company has declared a quarterly dividend of 75 cents a share, payable January 1. This places the stock on a $3 annual basis compared to the initial rate of $1.60 a year ago. The company added 50,000 square feet to its plant.

During the past year, William G. Allen of the Allen Screw Manufacturing Company and the American Specialty Company died.

MERIDEN—Business is ahead of last year, the **International Silver Company** declares. It is operating 100 per cent capacity and the stock of goods on hand is normal. Customers are buying frequently if not freely, it states. The company has more orders on its books than a year ago.

During the past year the Tiffany Company, a subsidiary of the **General Instrument Company**, and the **Acme Sterling Company**, both silverware concerns, located here.

WINSTED—Local wire companies are running at one-third capacity, after having had the busiest 10 months in their histories. **Strand and Sweet Manufacturing Company** has reduced the number of working hours in order to prevent discharging any of its employes. **Winsted Insulated Wire Company** has also reduced its hours. During the past year the **Polymet Manufacturing Company** acquired **Strand and Sweet**. The concern built an addition which increased its floor space 50 per cent. The Winsted Insulated Wire built an addition and placed in it 36 more machines.

THOMASTON—During the past year the **Seth Thomas Clock Company** increased its capital stock from $1,000,000 to $2,500,000.

NEW HAVEN—Directors of the **New Haven Clock Company** have declared the regular quarterly dividend of 37½ cents a share on the common, payable January 1.

—W. R. B.

Middle Atlantic States

Newark, New Jersey

JANUARY 2, 1930.

Vice-chancellor Church has appointed temporary receivers for the **Earl Radio Corporation**, manufacturers of radio sets, with headquarters in New York and a factory at Allwood, Passaic County. The receivers named were **Harry G. Hendricks** and **Arthur A. Klamer**, of Evansville, Ind. The company of which Klamer is president is creditor to the extent of $500,000. Earl Radio was formed in 1929 to take over the **Charles Freshman Company**, which in the fall of 1928 absorbed the **Freed-Eisemann Company**. The assets of the Earl company are approximately $4,000,000 and the liabilities are $3,800,000. The petition alleged that the company laid off about 2,000 employes and is now working at 50 per cent capacity and at a loss. **Westinghouse Electric and Manufacturing Company** is a creditor to the extent of $56,000.

Tung-Sol Lamp Works has acquired title to two properties in Seventh Avenue, Newark, adjoining its factory property, and will use the additional land for future enlargement of its plant.

Photographic Chemical Company, Inc., Linden, N. J., has applied to the Board of Health for permission to erect a building at West Fifteenth Street for the manufacture of a chemical used to develop films. The company says there will be no obnoxious odors and no danger to the residents living in the vicinity. The matter was referred to the health inspector for a report.

Westinghouse Electric and Manufacturing Company, 17 Academy Street, will erect a two-story brick factory building to cost $150,000.

Doubler Chemical Company has been incorporated with 1,000 shares common to manufacture chemicals.

—C. A. L.

Trenton, New Jersey

JANUARY 2, 1930.

Manufacturers of metal products have experienced a pretty good year but report that business has been better in previous years. During the summer months activity fell off somewhat at the majority of the plants, but began to improve in the fall. The manufacturers are looking for a good spring season.

Denial is made that the **Guarantee Trust Company** of New York has taken over operation of the reorganized **Mott Company**, according to **T. H. Eckerson**, newly elected executive vice-president and treasurer of the concern. Reports said the New York bank, trustee of the Mott concern, had assumed full charge of the plant and had changed the official and managerial personnel of the pottery and brass plant. Eckerson was recently designated treasurer of the Mott firm, succeeding W. G.

Probst. The latter, however, continues with the company as vice-president. **George Laib,** head of the $10,000,000 **Laib Pottery Company,** of Kentucky, continues as president and principal stockholder of the Mott Company, Eckerson said. The latter added that his own oppointment was the only change in the firm's personnel. The new treasurer declared that the company is making great strides in production. The enameled iron pottery and brass fixtures departments are all busy, Eckerson explained, and total production of the plant in 1929 increased 30 per cent above 1928. In the brass fixtures department, production is at peak and the company is hiring additional labor for that division. Eckerson explained that the firm is engaged in an expansion program which is expected to increase production and sales. A $19,000 showroom of the Mott company has just been completed in Chicago and similar display rooms are planned for New York, Boston and Philadelphia, where the firm has sales agencies.

United States Nickel Company, Allen Avenue, North Brunswick Township, Middlesex County, has filed a dissolution certificate in the office of the Secretary of State of New Jersey. The certificate, signed by the stockholders, was filed by **Walter C. Kerrigan,** secretary of the concern. The following are the directors and officers of the company: **Robert Louis Hoguet,** 47 East 92d Street, New York City; **Jacques de Gayarson de Fenoyl,** 77 Rue de Lille, Paris, France; **Walter C. Kerrigan,** 139 North 6th Avenue, Highland Park, N. J. Hoguet is president; de Fonoyl, vice-president; Kerrigan, secretary and treasurer; **A. Crettien,** Paris, France, assistant treasurer; **Georges Toussaint,** Paris, Fance, assistant treasurer.

The following concerns have been incorporated at Trenton: **General Metal Box Company;** metal boxes; $125,000; Perth Amboy. **James Brake Company;** manufacture brakes; $1,000,000; Camden. **Robert Mayer and Company;** zinc plates; $100,000; Hoboken. **Abworth, Inc.;** manufacture jewelry; $10,000; Passaic. **National Products Corporation;** manufacture metal products; 1,000 shares common; Glen Ridge.

—C. A. L.

Rome, New York

JANUARY 2, 1930.

This important center of copper, brass and other metal industries was more fortunate than some of its industrial rivals during the depression of the latter months of the year just closed.

There was a certain let-down that made its presence felt in the early autumn and continued spasmodically to the end of the year. This resulted in curtailed production by the metal industries and some part-time employment, but there was no complete cessation at any time, and on the whole 1929 was practically a normal year.

During the early part of the year many of the mills were operating constantly with three shifts, and an early return to the strenuous activity of that period is indicated as the new year opens.

There is a general report among the thousands of craftsmen employed here that all of the plants of the metal industry here, including those fabricating brass and copper, wire, and aluminum, will be operating full blast before the end of the present month.

Indications of the expected acceleration in 1930 are found in the expansion programs that have been carried out uninterruptedly by **Revere Copper and Brass Incorporated,** and by the **Rome Wire Company.** Installation of electric furnaces in Revere's new metal mill, which began some time ago, has been added to this year by the largest furnace of that type in existence. This modern method of reducing metals has served to increase production greatly and at the same time lessen labor costs.

The wire company has just about completed the installation of a great number of automatic machines to the same purpose.

Merger of the **Rome Brass and Copper Company** last year with six other companies in the east and middle west has made Rome the parent office of a huge industrial combine. The name first chosen for this consolidation was the **Republic Brass Company.** Late last year the name was changed to the **Revere Copper and Brass Incorporated,** in honor of **Paul Revere,** the Revolutionary patriot, who built the first copper rolling mill in the United States.

—R. C. M.

Middle Western States

Cleveland, Ohio

JANUARY 2, 1930.

Cleveland manufacturers, particularly those engaged in the non-ferrous field, are entering the new year with the usual confidence. For a few weeks there has been some decline in manufacturing and general business, but this period was expected and, so far as can be determined at this time, it is no more intense than a year ago. Already there are indications of a revival in the motor car industry. Accessory plants are starting on production and the body manufacturers are also beginning to show more activity. The business scare so pronounced a few weeks ago is gradually subsiding, and the old-time confidence again is appearing.

—F. J. H.

Toledo, Ohio

JANUARY 2, 1930.

General business conditions in Toledo and surrounding area are reported more favorable as the old year draws to a close. Most of the plants, particularly in the non-ferrous metal field, and also those in the plating industry, have a promising outlook for the new year. Production, particularly in motor car and airplane parts, is fair, with decidedly favorable prospects for the first quarter of the new year. From a business and manufacturing standpoint, Toledo is decidedly favored. In some quarters it is predicted that manufacturing will make even a better showing after the new year than it did for the same period a year ago.

Announcement is made that contracts amounting to several hundred thousands of dollars have been signed by Toledo automobile factories for delivery to a large concern in Detroit. **Electric Auto-Lite** has received contracts, it is stated, to supply complete starting, lighting and ignition equipment. Officers of the **Tillotson Manufacturing Company,** carburetor manufacturers, report that their organization has signed a contract to deliver carburetors to a large motor car concern for a period of one year.

—F. J. H.

Detroit, Michigan

JANUARY 2, 1930.

At the present time, just at the close of the year, industry of every nature in Detroit, with a few notable exceptions, is at a low ebb. One of the exceptions might be mentioned—the plating business. Strange as it may seem under prevailing conditions, plating is active, some of the plants operating nearly to capacity. But most of this activity is due to preparations now being made by many of the large automobile manufacturers in getting cars ready for exhibition at the annual shows in January and February.

The excitement of the recent stock market crash and a general curtailment of business is gradually wearing off, and the outlook for the new year seems more promising now than it did four weeks ago. Efforts of the great industrial leaders to bring about business confidence are bringing most encouraging results. The Ford Motor Company has increased wages and started to increase production. Other big plants in Detroit are doing likewise, and the middle west now is going into the new year confident that good things are in store for it.

Plans for the establishment of what probably will be the largest airplane plant in the world were discussed, it is stated, with executives of the General Motors Corporation in Detroit recently. It was indicated that the plant would be established in some southern state in order to obtain the advantage of year-round open weather which is not available in northern states.

The American Art Metal Works has recently been incorporated here with a capital stock of $50,000. The owners are **John Hartman, William A. Maher** and **Albert Rausch.**

November sales of the **Kalamazoo Stove Company** are reported at $773,950, against $538,831 for November, 1928, an increase of 43.6%. This is the eleventh consecutive month in which sales increased over the corresponding period of the preceding year.

Announcement is made that during the first half of 1930 the **Bohn Aluminum and Brass Corporation** will expand its plant facilities in Detroit at a cost of more than $1,000,000, to provide for increased production of new items in the company's line of products, according to Charles B. Bohn, president. The expansion will be financed out of the earnings, it is stated. Only a short time ago the company developed "Bohnalite," an aluminum alloy 62 per cent lighter than iron, used in the manufacture of a wide variety of castings and more recently extended to the forging field. This year "Bohnalite X" was introduced. This is a magnesium alloy, 36 per cent lighter than aluminum, and 78 per cent lighter than iron, and may be used in castings, forging and extrusion. The extrusion process was started early in 1928. According to Mr. Bohn, increasing use of aluminum and its alloys in aircraft manufacture will make that industry the company's biggest customer within the next five years. Already this company is said to be the largest parts manufacturer in the aviation industry, supplying pistons, bearings and a variety of castings. Its customers include every aviation motor manufacturer in the country. Of the automobiles now being manufactured, 60 per cent are equipped with "Bohnalite" pistons. It also supplies a considerable amount of other auto parts, including body hardware.

For nine months ending September 30, 1929, the Bohn Aluminum and Brass Corporation reports a net income of $2,474,906. This compares with a net income of $2,472,087 during the same period of 1928.

The Capital Castings Company, Lansing, has the distinction of being one of the few concerns of the kind now operating at practically 100 per cent of capacity. It is operating full time six days a week, with employment only slightly under the peak, it is stated.

Ford Motor Company, it is announced, will shortly begin constructing a new tri-motored, all-metal transport plane, to be known as the 7-AT. This plane, it is said, will have a carrying capacity of 15 persons in addition to baggage, a top speed of 135 miles an hour, and cruising speed of 112 miles an hour.

The Michigan Reduction Company, Saginaw, Mich., recently incorporated, has capital stock of $15,000, and is engaged in reducing and refining lead and lead products. The owners are **Edward O. Schade, Ben R. Mayne** and **Marvin E. Curran.**

Sale of the former plant of the **American Cash Register Company** at Saginaw to the **Saginaw Plating and Specialty Company** is announced by **Robert J. Brown** and **W. L. Miles,** who owned the property. The purchasing company is headed by **Rudolph Beuthin** and has for some time occupied rented quarters in a portion of the building.

Consolidation of the **Thomson Electric Welding Company,** of Lynn, Mass., and the **Gibb Welding Machine Company** of Bay City, Mich., has become effective, it is announced. The new organization is now known as the **Thomson-Gibb Electric Welding Company,** both plants continuing in operation, it is stated. The Thomson firm was a pioneer in resistance welding. It was formed in 1886 to exploit the basic resistance welding patents of Prof. Elihu Thomson, of Lynn, Mass.

Detroit Aircraft Corporation indicates its intention of centralizing all plane and parts manufacturing activities at Wayne, Mich., through the purchase of ten acres at the **Detroit-Wayne Industrial Airport** and the optioning of 20 additional acres. The site adjoins the **Stinson Aircraft Corporation's** plant. Construction of a factory will be started next year, it is announced.

McCord Radiator and Manufacturing Company's lubricator division reports an increase of approximately 38 per cent in business over the same period in 1928. During the past year the McCord organization put on the market a lubricator designed particularly for the Diesel type of engine.

M. M. Wise, president of the **Wise Chrome Products Company,** 2480 Bellevue Avenue, Detroit, reports a decided increase in the demand for chrome plated golf irons. "The chrome plating of golf irons is the only individual plating service conducted at our plant," Mr. Wise says, "all other plating being maintained on a production basis." The Wise Company is one of the country's largest chrome plating firms.

—F. J. H.

Chicago, Illinois

JANUARY 2, 1930.

Business in the metal trades in this part of the country has been satisfactory during the past year, according to eaders in the industry. There has been much building throughout the last twelve months which has helped the situation a great deal. The belief of most men in the field is that 1930 will be a good year.

Facilities for the production of at least two new items to be announced later, which will round out the firm's brass and copper producing business are being planned by the **Dallas Brass and Copper Company.**

—A. P. N.

Milwaukee, Wisconsin

JANUARY 2, 1930.

Milwaukee concerns in the metal industry are quite optimistic about the outlook for the coming year. This section of the country has been in a good condition economically for the past year or so. The 1929 volume ran about 10 per cent better than 1928 and an even larger increase is expected in 1930. Use of metal in building in the state of Wisconsin has increased a great deal the last few years, it is reported.

The Aluminum Corporation, Milwaukee, has been formed with **W. Bremer, N. Boehm** and **R. Schimmel** as the incorporators.

Joseph Koenig, 71, founder of the aluminum industry at Two, Rivers, Wis., and vice-president of the **Aluminum Goods Manufacturing Company,** died recently at his home after a short illness.

Milwaukee Stamping Company has taken over **Litterer Brothers** of Chicago and is moving that plant to West Allis, Wis., a suburb of Milwaukee, according to **Benjamin A. Otten,** secretary of the former company. The offices and factory of the Litterer firm will be retained in Chicago as a shipping warehouse. Milwaukee Stamping Company is a large manufacturer of builder's and automobile hardware and finished stamped specialties. Litterer Brothers, comprising the fourth largest manufacturer of metal partitions in the country, adds another important line to the Milwaukee firm's output. Litterer's annual volume of business comes to between $300,000 and $500,000. This should bring the annual volume of the Milwaukee firm to around $2,000,000 in 1930.

—A. P. N.

Other Countries

Birmingham, England

DECEMBER 28, 1929.

One of a series of lectures organized by the **Birmingham Jewellers' and Silversmiths' Association** as a means of introducing to employers and responsible employees modern developments in metallurgy and applied sciences connected with the trade was given recently in Birmingham by **W. R. Barclay,** a well-known local metallurgist at a Birmingham non-ferrous metal works. His subject was "Recent Metallurgical Developments of Interest to the Electro-plate Trade." In a survey of recent industrial research work in America and Europe bearing on electro-plating the lecturer said these developments referred not only to the materials used but also to processes. Under the heading of materials he dealt with typical developments in the use of nickel alloys of the German-silver and nickel-copper type, which differ mainly from the normal types in that they are capable of being worked hot. These hot-working alloys are more quickly produced and lend themselves to cheaper processes of manipulation, such as hot rolling and hot stamping. In regard to processes, Mr. Barclay said the casting of alloys from sheet metals in the electro-plating trade has undergone considerable development during the last few years, owing to the introduction of water-cooled metals. In the rolling processes important improvements have been made in machinery, mainly from the intro-

duction of "three-high," "four-high," and "cluster" mills, the advantages of which are quicker and more efficient rolling and more accurate gauging of metals.

In **the brass foundry trade** the general experience during the last month has been a falling off in orders and work has been carried on with a small reserve of business on the books. Seasonal trade in fancy brass and copper has accounted for a good deal of the activity, shops having stocked for the Christmas trade. There is a great feeling of uncertainty among manufacturers. Some of it is due to the change of Government, but it is also partly due to the instability of the copper market. This has resulted in hand-to-mouth purchasing. The trade has received what it describes as a serious blow by the increase of tariffs with Australia. Negotiations with that Colony are also becoming more difficult, owing to the fact that she is now able to produce many commodities which formerly were sent from England.

Continental competition in steam and water fittings of brass has declined this year and it is believed by Birmingham manufacturers that this is due in a large measure to the application of the **Merchandise Marks Act.** This act ensures that the country of origin shall be stamped on goods entering England and early in the year fittings were scheduled to come under its scope.

A big slump in prices has been a feature of the spelter market during the last few months. Values fell in November to a point not touched since before the war. Trades which are the chief consumers of this material are passing through a quiet period and are forced to buy on a limited scale. The galvanized sheet trade for weeks past has been doing little business and prices have also fallen quickly. Hollow-ware makers, too, have suffered from a slump, while brass manufacturers could not be induced to buy in the present uncertain state of the market.

Imports of copper ore from Canada in 1929 were only hali those of the previous year, but the British import of copper by way of the United States after it had been through the refineries was greater. British exports of bars, ingots, etc., in the first ten months of 1929 were 10,864 tons as against 6,135 tons in the corresponding period of the previous year. Plates, rods, wire, tubes and miscellaneous manufactures declined from 19,141 tons in the ten months of 1928 to 17,575 tons in 1929, owing to a falling off in the business with India, where there is keen competition. Rolled brass, sheets and strip exports were also less than the previous year.

Welsh tinplate trade has been quiet for some weeks. Operations at the mills and works were interrupted by severe flooding. Damage occurred that will take many weeks to repair. Overseas orders have mainly been from the European Continent and South America.

Metal rolling mills in Birmingham and district have added little to their order books lately. Tube drawers have a fair amount of work on hand and prices continue unchanged despite the fluctuations of the copper market. The jewelry trade has been experiencing a seasonal demand although employment even without the Christmas "push" is better than it has been for some time past. Art metals for gutters are in good demand as the gutter industry is in a flourishing condition. Competition between British firms is keen for this trade but fortunately it is one that is not hit by Continental competition as are many of the Midland industries.

Electroplaters find that trade with Canada is improving, and useful business is being done with South America, but the U. S. tariffs prevent the entry of British wares. Australia still takes some Birmingham electroplate although she is making a good deal with native labor.

—J. A. H.

Business Items — Verified

International Silver Company, 48 State street, Meriden, Conn., awarded contract for the construction of a three-story building, 322 x 55 ft.

Platt Brothers & Company, Waterbury, Conn., has awarded a contract for a one-story, 75 x 140 ft. addition to their building. Estimated cost, $42,000.

Cochrane Brass Foundry, York, Pa., has built an addition 40 by 60 ft., to its present building, making the total plant 60 by 120 ft. The cost of this addition and a few pieces of equipment was about $6,000, according to John H. Cochrane, owner.

San Francisco Galvanizing Works, Inc. 1176 Harrison street, San Francisco, Cal., hot process galvanizers, have awarded general contract for extensions and improvements to cost about $25,000. The company states it may add a cadmium plant department.

Haynes Stellite Company, Kokomo, Ind., is erecting a new foundry building which will probably be completed by the middle of February. The building will be used mainly for production of three new acid resisting alloys, having the trade-name "Hastelloy."

Baltimore Copper Smelting and Rolling Company, Canton, Baltimore, Md., has awarded general contract for a one-story addition to cost about $35,000 with equipment. This building will be used for their employment and welfare department with first aid hospital, replacing old facilities.

Kirchhof Patent Company, Newark, N. J., manufacturer of tin toys and other metal novelties, has removed its plant from 30 Stirling Street to a larger factory at 60-64 Union street, where production will be expanded. This firm operates the following departments: tool room, stamping.

Charles L'Hommedieu & Sons Company, Chicago, Ill., announce the appointment of **C. R. Percival,** 248 Lafayette street, New York City district sales representative for New York State and Northern New Jersey, including New York City. The L'Hommedieu company manufacture plating and polishing equipment and supplies.

Tiffany Aluminum Products Company, St. Louis, Mo., will remove to a new building which it has acquired at Branch and Buchanan streets. The company is headed by **Lee Rosenberg,** president, and operates an aluminum casting plant, polishing and grinding departments, etc. The offices as well as foundry will be located at the new building.

Arrangements have been made for the adoption of a group life insurance policy for the protection of the employes of the **Mueller Brass Company,** Port Huron, Mich. The policy was acquired through the Prudential Insurance Company of America, the total amount involved being $1,607,000, covering 767 lives. Each worker receives protection in amounts varying from $1,000 to $10,000.

R. S. Holland, Milwaukee, Wis., formerly connected with National City Products Company, same city, manufacturer of metal castings, etc., is organizing a company to establish a plant at Fort Wayne, Ind., for the production of brass, bronze, aluminum and similar castings. **J. B. Wiles** is interested in the project. This firm will operate the following departments: brass, bronze and aluminum foundry.

Pangborn Corporation, Hagerstown, Md., is installing a special sand blasting room 70 feet long at the huge plant of General Steel Castings Corporation, at Eddystone, Pa., now nearing completion. The sand blast room was specially designed to clean castings of the largest possible size, to be produced at this plant. Some of the castings will be locomotive frames, 65 feet long, with the cylinders integrally cast. Pangborn is also installing ventilation, dust-collecting, shakeout and sand-reclaiming systems for the sand-blasting department.

To celebrate an addition to their plant, which in the past year has doubled in size, and to welcome new members of the organization, which in the same period has grown from 750 to 1,150, the employes of the **Leeds and Northrup Company,** 4901 Stenton avenue, Philadelphia, Pa., held a minstrel show and dance in the ballroom of the Elks Club on Friday evening, December 13th, despite the traditional superstition associated with that date.

Inca Manufacturing Corporation, Fort Wayne, Ind., recently organized to manufacture copper wire products for radio, electric and other use, has completed the initial unit of a new

plant. This unit is 200 by 300 ft., one story, and cost over $100,000. The company has now begun an additional unit of the same size. **George A. Jacobs,** formerly president of the **Dudlo Manufacturing Company,** Fort Wayne, is president of the Inca company.

New Haven Sherardizing Company, Akron Division, had a very serious fire, in which they suffered a loss of 75 per cent in their plating and sherardizing departments. They are re-equipping and rebuilding their unit intact, adding many up-to-date methods and equipment to replace the old. They will be in full operation January 1st. The company wishes to thank their many friends and business associates for the courtesies and assistance given them.

The Linde Air Products Company, New York, announces the opening of an oxygen plant at 60 Knott street, Portland, Ore. This plant, which started operations on November 19th, 1919, is located on a private siding on the Oregon Washington Railroad. **A. D. Davis** is superintendent, and **D. F. Fox,** whose headquarters are at 114 Sansome street, San Francisco, Calif., is district superintendent. **R. G. Daggett** is division superintendent, with headquarters at 114 Sansome street, San Francisco, Calif., also.

Fred A. Barton and **Willard M. Hammond,** who for some years have conducted the Trenton Emblem Company, Trenton, N. J., have bought the plant formerly owned and occupied by the **Woodhouse Chain Company** of Edgely, Pa. The building is being remodeled and an addition 26 x 40 ft. is to be erected. The firm will be known as the **Edgely** Brass **Company,** and will manufacture brass, bronze and aluminum castings, etc. They will also conduct a machine shop and will do nickel and other plating. The business now being carried on in Trenton will be removed to Edgely.

Review of the Wrought Metal Business

The Past Month and Year and a Forecast for 1930

By J. J. WHITEHEAD

President of the Whitehead Metal Products Co. of New York, Inc.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

JANUARY 2, 1930.

The month of December differed, but little in a business way from the closing weeks of November. The declining demand for copper, brass and other copper alloys reached the low point about the 10th of the month, since which time improvement has been noted. The extreme caution and pessimism which prevailed early in December is now not so apparent. The situation looks ever so much better than it did at the beginning of last month, although it is still far from excellent. Despite the slowing up of general activity, the demand for Monel and nickel was well maintained during December. Prompt deliveries of nickel are still difficult to obtain.

The Year in Retrospect

The year 1929 as a whole compares favorably with 1928. The greatest activity was during the first nine months, after which a slackening was noted that culminated in a quiet period extending from November 10th to December 10th. Consumption of copper brass and other copper alloys was at an unprecedented rate during the spring months.

The consumption of Monel and nickel established new high records during 1929.

The deflation of the stock market was the outstanding event of 1929 and one that reflected or exerted the greatest influence on business activity.

During the spring of the year the price of copper reached 24c, a high point which it has not touched for a good many years. It reacted from this price level rather dramatically to 18c and has remained at this price for many months. During the closing months of 1928 it had been indicated that very unusual events would occur during the early part of 1929. It will be recalled that stocks of refined copper at the close of 1928 were down to about 45,000 tons. At the close of 1929, stocks of refined metal have increased to about 135,000 tons. It is believed that such stocks should never get below 200,000 tons, that all danger of a shortage of metal may be avoided. It is significant that during 1929 the usual spasmodic buying waves continued and that tremendous large tonnages of metal changed hands while the spurts were under way. As soon as requirements were filled a period of inactivity in the copper market was noted. The closing two months of 1929 were of such a character. It looks, however, as if before the year closes, or certainly early in 1930, that another large buying wave would occur. It is too bad that the production and consumption of copper is not on a more even keel. It certainly is not the fault of the producers. The best thing for the entire industry is to have consumers buy copper steadily, as they need it, rather than all come into the market at one time, and perhaps no year in the entire history of the industry illustrates this better than 1929.

Looking Forward

It is believed that the year 1930 will be as good as 1929, if not better. It is anticipated, however, that business probably will be a little slow in getting started.

We are having a period of business recession but not depression. It is true that the recession is perhaps more than could normally be expected, but the serious deflation of the stock market caused greater concern and caution than would normally have been excercised. Even as the year closed the extreme caution exercised was giving way to a more optimistic feeling. It is believed that we are not in for any serious period of depression because in the present instance the following facts are of outstanding significance: no commodity inflation; low inventories, in fact sub-normal stocks being carried, stringency of funds eliminated by deflation of stock market, resulting in cheap money for building and other industrial purposes; excellent credit structure; United States is a creditor nation; business leaders are making every endeavor to prevent unemployment and reduction of wages.

The building industry showed the greatest falling off during 1929. It will probably be about April or May before this industry recovers its momentum. It is estimated that building during 1930 will amount to about $8,000,000,000. If this amount of money is expended during the year, and indications are that such will be the case, the year for the building industry will be normal.

The automobile industry will certainly show a substantial comeback from the low point production reached in November and December. It is believed that this industry will produce at least 75% as many cars in 1930 as it did in 1929.

As 1929 closed, exports of gold were going forward in good volume, a desirable factor for our export trade.

The public utilities expect to spend very large sums for extension of their facilities. From the sums mentioned in the newspapers it is conservatively estimated that electric power, telephone and telegraph companies, etc., will spend at least $1,000,000,000 for improvements in 1930. This means the probable use of about 1,000,000,000 pounds of copper, a tremendous amount.

The railroads are going ahead with electrification and other improvements and this means further consumption of copper and its alloys, as does all electrical work.

There will be no let-up in the demand for Monel and for nickel, and distributors still urge that those who require these materials, especially nickel, should anticipated their needs.

Every indication at this time is that 1930 will be a good year. The fact that distributors are increasing their warehouse facilities in many cities indicates a healthy optimism which will undoubtedly be borne out by the events of the year just begun.

Metal Market Review

By R. J. HOUSTON

D. Houston and Company, Metal Brokers, New York

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

COPPER

JANUARY 2, 1930.

Extraordinary price stability was the outstanding feature during 1929 in the copper situation. At the beginning of the year the domestic market was quoted at 16¾ cents for electrolytic delivered to Connecticut Valley points and 17 cents c. i. f. European ports. On this basis the market was strong and active, and before the end of January large volume business was booked at 17c and 17¼c

The opening in February was at 17¼c to the home trade and 17½c for foreign shipment. A brisk rise in prices occurred that month. Sales were conspicuously heavy as the market continued to develop further strength. Demand became increasingly active as the upward trend gained momentum, and at the close of February the local price was quoted at 19¼c to 19½c. The upward trend continued in March. The market reached a new high that month, and on large and excited buying prices advanced from 19½c to 24c. After this sudden spurt reaction soon set in and the market fell with precipitate speed to 19½c by April 9 and on April 16 was down to 18c.

From about the middle of April to the close of 1929 the market gave an impressive demonstration of remarkable stability. During a period of more than eight months prices were maintained on the basis of 18 cents a pound delivered to Connecticut Valley points and 18.30 cents c. i. f. European ports. A tremendous buying movement took place in late August and early September. American and European consumers bought an enormous tonnage for nearby and future deliveries at these figures. The heaviest copper purchases in many months occurred at that time. It looked like somewhat higher prices at this stage of the situation, but prevailing market values appeared satisfactory to the majority of producers. Recent business was on a restrictive scale. Export sales, however, were in substantial volume and indicates that Europe is operating on limited supplies. The stock market collapse in October injected the element of uncertainty into business generally. Buying sentiment became extremely cautious. This uncertain trend may last a little longer than expected, but there are no large inventories in consumers' hands that would cause consternation and no evidence that big scale requirements are going to drop out of sight. With curtailment of copper production now in effect, a sound balance between supply and demand should result in the near future. Consumption of copper for electrical and utility purposes in 1930 is expected to exceed that in 1929. Many factors making for enormous requirements are clearly discernible. There is much to inspire confidence. Hence the outlook for next year is viewed with bright hopes for all that will give new momentum to successful business.

Domestic and export demand for new American refined copper in 1929 (estimating figures for December) amounted to 3,517,528,000 pounds as compared with 3,315,362,000 pounds in 1928, an increase of 202,166,000 pounds. Refined stocks in primary hands at beginning of year were 130,932,000 pounds. On December 1, they had increased to 253,838,000 pounds. It will be recalled that on April 1 surplus holdings of refined were down to 105,936,000 pounds. This was considered too low for trade requirements to draw on in case of a sudden demand. Supplies were therefore built up subsequently to present dimensions so that any danger of shortage for quick shipment does not exist. It is significant that even now refined supplies on hand do not equal average requirements for one month.

ZINC

The technical and market position of zinc reflect the unfavorable conditions surrounding this commodity. The market decline in the prices of both the ore and slab metal recently shows the result of a continuing process of over-production. There has been a world-wide tendency toward over-production which normal demand cannot absorb. Through excessive expansion of output there has been a pronounced decrease in values as expressed in market prices. And this development is of such pressing moment that American and European zinc interests have tried to adopt measures that would overcome the obstacles confronting the industry as a whole. The European Zinc Cartel has been engaged in trying to evolve a plan that would solve problems and differences in a manner satisfactory to all concerned. There is no decisive information that the object has been achieved at this writing, but some program may be concluded later.

During the past year the price of prime Western slab zinc has declined from 6.80c per pound, East St. Louis basis, in March to 5.45c to 5.50c in closing days of December. The low point in 1929 was 5.45c on December 17, the decline in final month of the year being fully half a cent a pound. Zinc ores dropped from $44.00 per ton early in November to $35.00 in the last half of December. Smelters' stocks of slab zinc on December 1 amounted to 63,061 tons, the largest carryover since early in 1922. The November output was reduced 3,318 tons from previous month's figures, but shipments dropped down to 41,675 tons, the smallest since June, 1925. There was some recent curtailment of output, but obviously it was inadequate to help either the statistical or market position. Consumption in 1929 was good but not good enough to give the market the substantial support it needs. Interest now centers on the probable developments in 1930. Consumers will require a large tonnage to carry them through the first and second quarters of the new year, and present low prices should stimulate aggressive inquiries.

TIN

Developments in the tin situation caused some radical changes in market values during the past year. There were frequent erratic fluctuations in prices both here and abroad. Many factors operated to weaken the position of the metal, the most notable of which were the continued high rate of production, causing a heavy increase in total new supplies, and lack of vigorous market support much of the time.

In spite of the fact that American tin deliveries in 1929 were the largest on record, the New York market for prompt Straits tin near the close of the year was 39⅞ cents. During a single week in December the London price declined £11 2s 6d per ton and the domestic quotation 1c per pound. The high price of the year for Straits was 50⅜c on February 5 and the low 38⅛c on December 6, a spread of 12 cents a pound. The dip to 38⅛c last year was the lowest price since 1923 when the market touched 37½c.

A program for restriction of tin output at the chief producing centers of the world is proposed as a remedy against excessive supplies and market depression. The movement appears to have the support of leading producers and smelters. A combination of tin producers and smelting companies could probably put the entire industry on a new and sounder footing. It is believed factors are now at work that foreshadow important developments during the new year. Reports of a stabilizing program going into effect was responsible for a slightly firmer market, but the outlook for American deliveries in 1930 is so uncertain that many cross currents and fluctuations are anticipated during the coming weeks.

LEAD

The year just closed was one of frequent and rather wide fluctuations in prices of pig lead. There were a number of factors responsible for these conditions, including heavy production, large increase in stocks compared with a year ago and a decrease in deliveries. Sentiment was also considerably unsettled by the stock market panic, and since that time domestic prices have declined a half a cent per pound. As a matter of fact, present prices are the lowest in more than a year, but taken as a whole there is a steady tone to the market on the basis of 6.10c East St. Louis and 6.25c New York. This compares with 6.65c New York at beginning of 1929.

Consuming demand was maintained at a high rate last year. The two major industries, cables and batteries, were especially active. Requirements for lead-covered cables have been on a growing scale lately, and there is the prospect for an expanding demand from this source during the coming months. A great program of industrial development looms up for 1930. If there

is no pronounced shift to over production the underlying effect of favorable statistics will be a decided gain for the lead industry. New buying should be a conspicuous factor early in the new year as prices are on an attractive basis compared with the first half of 1929 when the New York quotation touched as high as 7.75c.

ALUMINUM

The general trend of aluminum prices was steady in 1929. No weak spots appeared to develop during the past year. Volume of production and consumption were both at a record rate in 1929. World production last year is estimated at about 585,000,000 pounds, as against 500,000,000 pounds in 1928. The United States is the outstanding and leading producer, with Canada holding second place and Germany standing third. Aluminum industry is a particularly prosperous one and according to expert opinion there is no over-production of the metal. The ratio of consumption to output is so well balanced that increased productive capacity is deemed necessary to keep up with an expanding demand. Secondary or remelted aluminum plays an important part in the situation. Prices for this grade fluctuate more or less, but the market for primary pig metal has remained unchanged for the past two years. There were large imports and exports of aluminum last year. The international features of the business are being successfully developed on a more important scale.

ANTIMONY

Trade conditions in antimony were exceptionally quiet a good part of the past year. The market has been a hum drum, featureless affair lately and the recent price level of 8¼c a pound, duty paid, was exactly a cent a pound below the low mark for 1928. The high price in 1929 was 9⅞c, the quotation in March, with 8¼c the low to which the market declined in both July and December. As a result of prevailing conditions buyers were more apathetic than aggressive. Total shipments from China to the United States during the eleven months ending November last year amounted to 7,325 tons, as against 6,897 tons in the same period 1928. The rate of Chinese output was estimated at about 1,400 tons per month. Stocks in China at the beginning of December were estimated at about 1,500 tons at Changsha and 745 tons at Han Kow. The impression is that domestic consumers are carrying light stocks. Uncertainty regarding forthcoming tariff schedules is detrimental to market activity, but demand is expected to improve during the first quarter of 1930.

QUICKSILVER

The quicksilver market has been firmer and the commodity in better demand lately. Sales of the European product were made in substantial quantities in this country recently. Producers are now considered in better position, with price quoted at $124 per flask of 75 pounds.

PLATINUM

The position of this article shows a slightly easier tendency the last few months. Refined platinum is now quoted at $60 to $61 per ounce. Output of the metal from deposits in Canada are expected to show a large increase in the near future.

SILVER

Elements of weakness were the outstanding developments in silver during 1929. The market suffered from many depressing influences lately. Price movements have shown a pronounced downward tendency for months past and on December 30 there was a drop to 46½ cents per ounce which establishes a low record for many years. Recent decline was attributed to the collapse of a Chinese speculative pool which liquidated heavy holdings acquired sometime ago in anticipation of improved demand which did not materialize. There is also apprehension over maintaining the monetary standard of silver in some of the Far East nations. Stocks of silver in China and India are large. Recent output in the United States also showed an increase, large quantities being produced by the copper companies as a byproduct. It will take some sharp and decidedly favorable development to create a rebound from the present low price level.

OLD METALS

Enormous quantities of scrap metal of all grades were absorbed for consumption in 1929. The copper grades were in heavy demand and shipments for treatment at refiners were notably large. It stated that dealers' stocks of copper and brass are comparatively light. At the end of the year there was a waiting attitude because of the uncertainty over the price for new metal in the new year. A lively demand from abroad is expected in 1930. More settled conditions are looked forward to in the next few weeks, and when this occurs a period of decided activity will undoubtedly take place. Dealers' buying prices are quoted at 15c to 15¼ for crucible copper, 11c to 12c for light copper, 9½c to 10c for new brass clippings, 4¼c to 4¾c for heavy lead and 16½c to 17c for aluminum clippings.

Daily Metal Prices for the Month of December, 1929

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	2	3	4	5	6	9	10	11	12	13	16	17
Copper c/lb. Duty Free												
Lake (Del.)	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125	18.125
Electrolytic (f. a. s. N. Y.)	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75
Casting (f. o. b. N. Y.)	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.875	16.875	17.00	17.00	17.00
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	5.95	5.95	6.00	6.00	5.90	5.90	5.90	5.80	5.70	5.65	5.50	5.50
Brass Special	6.05	6.05	6.05	6.00	6.00	6.00	6.00	5.90	5.85	5.80	5.60	5.60
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	38.80	39.375	38.875	38.45	38.375	39.75	39.625	39.50	39.75	41.25	41.75	41.375
Pig 99%	38.00	38.50	38.125	37.75	37.625	39.00	38.875	38.75	39.	40.375	40.875	40.50
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.10
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	8.50	8.375	8.50	8.50	8.50	8.50	8.45	8.45	8.45	8.45	8.40	8.35
Silver c/oz. Troy Duty Free	49.25	49.125	49.125	49.375	49.625	49.50	49.375	49.125	49.125	49.00	49.00	49.75
Platinum $/oz. Troy Duty Free	61.50	61.50	61.50	61.50	61.50	61.50	61.50	61.50	61.00	61.00	61.00	61.00

	18	19	20	23	24	*25	26	27	30	31	High	Low	Aver.
Copper c/lb. Duty Free													
Lake (Del.)	18.00	18.00	18.00	18.00	18.00	....	18.00	18.00	18.00	18.00	18.125	18.00	18.071
Electrolytic (f. a. s. N. Y.)	17.75	17.75	17.75	17.75	17.75	....	17.75	17.75	17.75	17.75	17.75	17.75	17.75
Casting (f. o. b. N. Y.)	17.00	17.00	17.00	17.00	17.00	....	17.00	17.00	17.00	17.00	17.00	16.75	16.904
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	5.45	5.50	5.50	5.50	5.50	....	5.45	5.45	5.45	5.45	6.00	5.45	5.667
Brass Special	5.55	5.60	5.60	5.60	5.60	....	5.55	5.55	5.55	5.55	6.05	5.55	5.767
Tin (f. o. b. N. Y.) c/lb. Duty Free													
Straits	40.75	40.50	39.75	39.50	39.875	....	39.875	39.375	39.25	39.75	41.75	38.275	39.786
Pig 99%	40.	39.75	39.125	38.75	39.25	....	39.25	38.625	38.50	39.	40.875	37.625	39.030
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.10	6.10	6.10	6.10	6.10	....	6.10	6.10	6.10	6.10	6.10	6.10	6.10
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	....	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb.													
Ingot	35	35	35	35	35	....	35	35	35	35	35	35	35
Shot	36	36	36	36	36	....	36	36	36	36	36	36	36
Electrolytic	35	35	35	35	35	....	35	35	35	35	35	35	35
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	8.35	8.35	8.25	8.35	8.35	....	8.50	8.50	8.50	8.50	8.50	8.25	8.432
Silver c/oz. Troy Duty Free	49.625	48.375	48.50	47.25	47.375	....	47.375	47.125	46.50	46.75	49.75	46.50	48.583
Platinum $/oz. Troy Duty Free	61.00	61.00	61.00	61.00	61.00	....	61.00	61.00	61.00	61.00	61.50	61.00	61.190

*Holiday.

Metal Prices, January 6, 1930

NEW METALS

Copper: Lake, 18.00. Electrolytic, 18.00. Casting, 17.00.
Zinc: Prime Western, 5.40. Brass Special, 5.50.
Tin: Straits, 38.75. Pig, 99%, 37.875.
Lead: 6.10. **Aluminum,** 24.30. **Antimony,** 8.375.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: flask, 75 lbs., $124.00. **Bismuth,** $1.70.
Cadmium, 95. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 44.75.
Gold: oz., Troy, $20,67. **Platinum,** oz., Troy, $61.50.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	12¼to12½
Brass Ingots, Red	15½to15¾
Bronze Ingots	16½
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	27 to39
Manganese Bronze Ingots	13½to19
Manganese Bronze Forging	35 to43
Manganese Copper, 30%	25 to35
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots	16½to19¾
Phosphor Bronze	17 to21
Phosphor Copper, guaranteed 15%	20½to24
Phosphor Copper, guaranteed 10%	20 to23½
Phosphor Tin, no guarantee	45 to60
Silicon Copper, 10%, according to quality	25 to35

OLD METALS

Buying Prices		Selling Prices
14 to14½	Heavy Cut Copper	15 to15½
13½to13¾	Copper Wire, mixed	14½to14¾
12 to12¼	Light Copper	13 to13¼
11 to11¼	Heavy Machine Composition	12 to12¼
7¾to 8	Heavy Brass	8¾to 9
6¼to 6¾	Light Brass	7¼to 7¾
11 to11¼	No. 1 Composition	12 to12¼
10 to10¼	Composition Turnings	11 to11¼
4⅜to 4⅞	Heavy Lead	5⅜to 5⅞
2½to 3	Zinc Scrap	3½to 4
15½to16	New Aluminum Clips	19½to20
10 to10¼	Scrap Aluminum, cast alloyed	15 to15¼
10½to11	Scrap Aluminum sheet (new)	13 to14
24 to26	No. 1 Pewter	29 to30
20 to21	Old Nickel Anodes	22 to23
20 to23	Old Nickel	22 to25

Wrought Metals and Alloys

COPPER SHEET

Mill shipment (hot rolled) .....27¾c. to 28¾c. net base
From Stock .....28¾c. to 29¾c. net base

BARE COPPER WIRE

19⅝c. to 19⅞c. net base, in carload lots.

COPPER SEAMLESS TUBING

29¼c. to 30¼c., net base.

SOLDERING COPPERS

300 lbs. and over in one order .....26¼c. net base
100 lbs. to 200 lbs. in one order .....26¾c. net base

ZINC SHEET

Duty on sheet, 2c., per pound	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 7 per cent discount	10.50 net base
Casks, jobbers' price	10.75 net base
Open casks, jobbers' price	11.25to11.75 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price, ton lots.....33.30c.
Aluminum coils, 24 ga., base price, ton lots.....31.00c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	53c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 10½c. over N. Y. Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 49.00c. per ounce, Troy upward, according to quantity.

BRASS MATERIAL—MILL SHIPMENTS

In effect April 16, 1929
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.23¼	$0.25	$0.26¼
Wire	.23¾	.25½	.26¾
Rod	.21¼	.25¾	.27
Brazed tubing	.30⅞	....	.35⅞
Open seam tubing	.31¼	....	.34¼
Angles and channels	.31¼	....	.34¼

BRASS SEAMLESS TUBING

28¼c. to 29¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	25¾c. net base
Muntz or Yellow Metal Sheating (14"x48")	24c. net base
Muntz or Yellow Rectangular sheet other Sheating	25c. net base
Muntz or Yellow Metal Rod	22¼c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	31⅜c.	10% Quality	34⅛c.
15% Quality	33c.	15% Quality	37¾c.
18% Quality	34¼c.	18% Quality	41c.

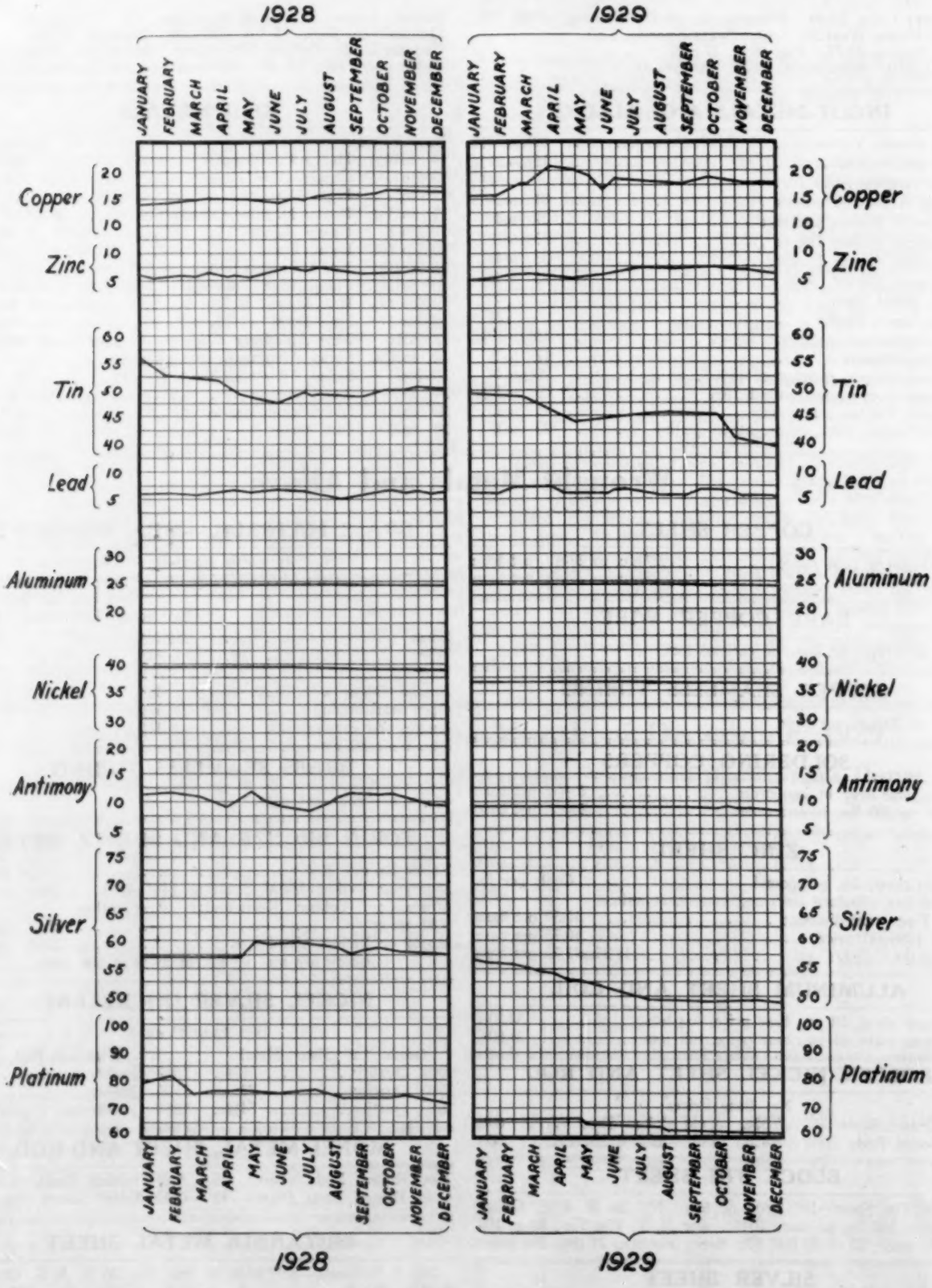
MONEL METAL, SHEET AND ROD

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs. 25c. over. Prices f. o. b. mill.

Chart of Metal Prices for 1928-1929



Supply Prices on Page 60

Pig Iron and Metal Products of the United States

Calendar Years 1920-1928. (1929 Estimated.)

(FROM THE UNITED STATES BUREAU OF MINES)

PRODUCTS METALLIC	1920 Quantity	1920 Value	1921 Quantity	1921 Value	1922 Quantity	1922 Value	Products
Pig iron (spot value), long tons	35,710,227	$1,140,904,096	16,038,619	$389,437,792	27,670,738	$608,144,858	Pig iron
Copper, sales value, pounds	1,209,061,040	222,467,000	505,586,098	65,221,000	950,285,947	128,289,000	Copper
Zinc, sales value, short tons	450,045	72,907,000	198,232	19,823,000	353,274	40,273,000	Zinc
Tin, short tons	22	22,000	4	2,400	1	912	Tin
Lead (ref.) sales value, short tons	476,849	76,296,000	398,222	35,840,000	468,746	51,562,000	Lead
Aluminum, pounds	*	41,375,000	*	10,906,000	*	13,622,000	Aluminum
Nickel, value at New York, short tons	365	293,250	111	86,000	208	133,191	Nickel
Quicksilver, value at S. Fran., flasks.	13,392	1,066,807	6,339	300,595	6,375	368,348	Quicksilver
Antimonial lead, short tons (F.&D.).	12,535	1,963,255	10,064	870,059	8,075	844,993	Antim. Lead
Silver, commercial value, troy ounces.	55,361,573	60,801,955	53,052,441	53,052,441	56,240,048	56,240,048	Silver
Gold, coining value, troy ounces	2,476,166	51,186,900	2,422,006	50,067,300	2,363,075	48,849,100	Gold
Platinum and allied metals, value at New York City, in troy ounces	41,544	4,697,722	56,370	4,238,989	57,718	5,932,726	Platinum
Total value of metallic products (approximate) (b)		$1,762,350,000		$654,130,000		$987,180,000	

PRODUCTS METALLIC	1923 Quantity	1923 Value	1924 Quantity	1924 Value	1925 Quantity	1925 Value	Products
Pig iron (spot value), long tons	38,361,379	$946,799,378	31,064,129	$665,078,972	36,814,702	$739,316,333	Pig iron
Copper, sales value, pounds	1,434,999,962	210,945,000	1,634,249,192	214,087,000	1,674,869,886	237,832,000	Copper
Zinc, sales value, short tons	508,335	69,134,000	515,831	67,058,000	555,631	84,456,000	Zinc
Tin, short tons	2	1,623	7	7,028	14	15,980	Tin
Lead (ref.) sales value, short tons	543,841	76,138,000	566,407	90,625,000	654,921	113,956,000	Lead
Aluminum, pounds	*	28,305,000	*	37,607,000	*	36,430,000	Aluminum
Nickel, value at New York, short tons	100	71,605	191	114,903	272	169,664	Nickel
Quicksilver, value at S. Fran., flasks.	7,937	521,302	10,085	692,739	9,174	762,616	Quicksilver
Antimonial lead, short tons (F.&D.).	14,190	1,950,370	20,787	3,376,713	19,667	3,785,547	Antim. Lead
Silver, commercial value, troy ounces.	73,335,170	60,134,839	65,407,186	43,822,814	66,155,424	45,911,864	Silver
Gold, coining value, troy ounces	2,502,632	51,734,000	2,528,900	52,277,000	2,411,987	49,860,200	Gold
Platinum and allied metals, value at New York City, troy ounces	49,797	5,762,305	66,007	7,611,319	49,643	5,661,809	Platinum
Total value of metallic products (approximate) (b)		$1,510,930,000		$1,232,330,000		$1,380,280,000	

PRODUCTS METALLIC	1926 Quantity	1926 Value	1927 Quantity	1927 Value	1928 Quantity	1928 Value	Products
Pig iron (spot value), long tons	38,181,053	$749,633,468	34,866,644	$646,226,139	38,303,699	$661,351,270	Pig iron
Copper, sales value, pounds	1,739,622,094	243,547,000	1,684,040,983	220,609,000	1,825,900,000	262,930,000	Copper
Zinc, sales value, short tons	611,991	91,799,000	576,960	73,851,000	591,525	72,166,000	Zinc
Tin, short tons	8	10,400	27	34,600	46	46,400	Tin
Lead (ref.) sales value, short tons	680,685	108,910,000	668,320	84,208,000	626,202	72,639,000	Lead
Aluminum, pounds	*	37,583,000	*	39,266,000	*	47,899,000	Aluminum
Nickel, value at New York, short tons	323	234,558	860	390,740	522	291,836	Nickel
Quicksilver, value at S. Fran., flasks.	7,642	702,323	11,276	1,314,782	16,838	2,052,205	Quicksilver
Antimonial lead, short tons (F.&D.).	22,524	3,916,714	24,347	3,277,043	33,058	*	Antim. Lead
Silver, commercial value, troy ounces.	62,718,746	39,136,497	60,434,441	34,266,328	56,020,268	32,771,857	Silver
Gold, coining value, troy ounces	2,335,042	48,269,600	2,197,125	45,418,600	2,233,251	46,165,400	Gold
Platinum and allied metals, value at New York City, in troy ounces	84,981	9,210,669	46,050	3,780,216	51,427	3,911,023	Platinum
Total value of metallic products (approximate) (b)		$1,402,920,000		$1,217,000,000		*	

1929 ESTIMATED	Quantity	Value Total	Value Per Unit
Pig iron (spot value) long tons	42,400,000	$781,432,000	$18.43 ton (a)
Copper, sales value, short tons	1,005,700	320,315,450	15.925c. lb. (c)
Zinc, sales value, short tons	600,000	77,880,000	6.49 c. lb. (d)
Tin (imports) long tons	89,110	90,501,500	45.34 c. lb.
Lead (pig), sales values, short tons	678,000	95,614,800	6.83 c. lb. (d)
Aluminum, short tons	99,000	48,114,000	24.30 c. lb.
Silver, troy ounces	60,987,600	32,540,678	53.351c. oz.
Gold, troy ounces	2,128,027	43,990,200	$20.67 oz.

(a) Composite, from The Iron Age.

(b) Includes some items of minor interest to metal trades not shown in table.

(*) Bureau not at liberty to publish figures, or figures unobtainable.

(c) New York.

(d) E. St. Louis.

Supply Prices, January 2, 1930

ANODES

Copper: Cast ..... 28c. per lb.
Rolled, oval ..... 27c. per lb.
Rolled, sheets, trimmed ..... 26¼c. per lb.
Brass: Cast ..... 27c. per lb.
Zinc: Cast ..... 12⅛c. per lb.

Nickel: 90-92% ..... 45c. per lb.
95-97% ..... 47c. per lb.
99% ..... 49c. per lb.
Silver: Rolled silver anodes .999 fine are quoted from 50¼c., Troy ounce, upward, depending upon quantity.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & Over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/28 Unbleached	$25.84 to $28.30
14" 20 ply 64/68 Unbleached	34.86 to 37.34
12" 20 ply 80/92 Unbleached	31.25 to 34.16
14" 20 ply 80/92 Unbleached	42.40 to 46.09
12" 20 ply 84/92 Unbleached	39.31 to 42.90
14" 20 ply 84/92 Unbleached	52.62 to 57.60
12" 20 ply 80/84 Unbleached	38.35 to 39.37
14" 20 ply 80/84 Unbleached	52.00 to 53.12

Sewed Pieced Buffs, per lb., bleached ..... 52c to 71c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.11-18
Acid—Boric (Boracic) Crystals	lb.	.08½
Chromic, 75 to 400 lb. drums	lb.	.19-21
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.16¾-.21¼
Denatured, drums	gal.	.52-.60
Alum—Lump, barrels	lb.	.0325
Powdered, barrels	lb.	.039
Ammonium chloride, solution in carboys	lb.	.06½
Ammonium—sulphate, tech., bbls	lb.	3.3
Sulphocyanide	lb.	.65
Arsenic, white, kegs	lb	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls	lb.	.04½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.25
Chromic Sulphate	lb.	.30-.40
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.21½
Cyanide (100 lb. kgs)	lb.	.45
Sulphate, bbls.	lb.	6.7
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$70.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$12.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron Sulphate (Copperas), bbl.	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Nickel—Carbonate, dry bbls.	lb.	.35
Chloride, bbls.	lb.	.20
Salts, single, 300 lb. bbls.	lb.	.12½-.13
Salts, double, 425 lb. bbls.	lb.	.12½-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.093
Potassium Bichromate, casks (crystals)	lb.	.09¼
Carbonate, 96-98%	lb.	.06¾-.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.05½
Silver Chloride, dry, 100 oz. lots	oz.	.40½
Cyanide (fluctuating)	oz.	.49½
Nitrate, 100 ounce lots	oz.	.35
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.18
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls.	lb.	.04¾
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.02
Sulpho Cyanide	lb.	.32½
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb kegs	lb.	.34
Tripoli, Powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls.	lb.	.11
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03½